

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY^{1/}

Core samples of the Green River Formation from Gentry Oil Company's
 Corehole No. 2 drilled in 1963 in SW1/4 sec 30, T 5 S, R 97 W,
 6th P.M., Garfield County, Colorado (727.2 ft N of S line and
 2257.8 ft E of W line)

Surface elevation: 8107.8 feet
 Sampled section: 190.0 to 791.0 feet
 Mahogany marker: 693.2 feet

From	To	Description
190.0	197.5	Siltstone: light to rare medium gray (7-6N, rare 5.5N; slight brown tint). Massive to faintly mottled and streaked. Irregular parting; irregular to conchoidal fracture. Rare to fairly common brownish-black blebs and streaks. Some irregular fractures with olive-green fillings. Finely interfingering contact with oil shale below.
197.5	200.0	Oil shale, lean: dark to medium and some light brownish-gray (10YR 2/2-4/2, some 5/2-6/2). Faint to moderately distinct, irregular and distorted to some fairly smooth laminations; some small loop structures. Slightly irregular to some very irregular, thick shaly parting; irregular to conchoidal fracture. Rare yellowish-brown to buff crystalline calcite stringers.
200.0	202.9	Oil shale, lean: dark brownish-gray to buff (10YR 3/2-7/2; slight olive tint in lower half). Distinct very irregular, distorted and displaced laminations. Slightly irregular to very irregular thick parting; irregular to conchoidal fracture. Rare irregular calcite stringers.
202.9	207.2	Siltstone and mudstone: like 190.0 to 197.5 feet. Interfingering contact at top; sharp irregular contact at base.
207.2	209.5	Oil shale, lean: dark brownish-gray to some buff (10YR 3/2-5/2, some 2/2 and 6/2-6/3). Moderately distinct irregular and slightly distorted laminations; very common small loop structure. Slightly irregular to rare very irregular thick shaly parting; irregular to conchoidal fracture. Very rare thin irregular calcite stringers. Rare black plant fossils (?) on parting surfaces.
209.5	212.1	Oil shale, lean to very lean: medium and rare dark olive-gray to yellowish-buff (2.5Y 5/2-7/2, rare 4/2-3/2 and 8/2). Moderately distinct to very faint, irregular and slightly distorted laminations; very common small loop structures. Regular to some irregular thick shaly parting; slightly irregular to conchoidal fracture. Very rare small crystalline calcite lenses.

Illustration No. SBR-3846P (Sheet 1 of 49)

^{1/} By L. G. Trudell.

Laramie Petroleum Research Center, Laramie, Wyoming August 17, 1964

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
212.1	225.5	Siltstone, mudstone and rare marlstone: very light to medium gray (7.5-5.5N; slight brown tint) and some light brownish-gray to buff (10YR 6/2-8/2). Faint irregular streaks, stringers, and bands to mottled and some massive. Slightly irregular to very irregular parting; conchoidal to slightly irregular fracture. Rare brownish-black streaks. Rare vuggy zones with very fine to fairly large pyrite crystals.
225.5	240.5	Mudstone: gray buff (10YR 7/1-8/1; almost neutral). Massive to some very faintly mottled and streaked. Irregular parting; slightly irregular to conchoidal fracture. Some fine black flecks. Rare fine marlstone streaks and shreds. Rare large irregular <u>limonite-stained vugs</u> .
240.5	248.9	Mudstone, siltstone, and rare marlstone: gray buff to rare medium brownish-gray (10YR 7/1-6/1, rare 5/1-4/1; almost neutral). Massive to faint irregularly streaked mudstone and siltstone with irregular bands, stringers, streaks, and shreds of marlstone. Irregular parting; slightly irregular to conchoidal fracture.
248.9	251.4	Oil shale, very lean: medium and rare dark brownish-gray and olive-gray to buff (10YR and 2.5Y 5/2-7/2, rare 4/2-3/2). Moderately distinct to faint, irregular, distorted, and displaced laminations; common loop structures in upper part. Slightly irregular to some very irregular, thick to medium shaly parting; irregular to conchoidal fracture. A very irregular neutral gray (5.5-6N) silty stringer at 249.3 feet. Some thick to thin, gray-buff to gray mudstone and siltstone stringers in lower part.
251.4	266.2	Siltstone, mudstone, and some lean oil shale and marlstone: gray-buff to rare medium brownish-gray siltstone and mudstone (10YR 8/1-7/1, rare 6/1-5/1; almost neutral); brownish-gray to buff oil shale and marlstone (10YR 5/2-7/2; some very slight olive tint). Massive and rare irregularly streaked siltstone and mudstone with some very irregular bands, stringers, shreds, streaks, and fragments of irregularly laminated oil shale and marlstone (especially in upper part). Common small to fine black flecks in clastics.
266.2	266.9	Oil shale, medium: brownish-black to dark brownish-gray and rare dark brown (10YR 1/2-3/2, rare 3/3). <u>Very</u> faint streaked bedding to faint irregular, distorted and some contorted laminations. Regular to very irregular, medium to thick parting; smooth to slightly irregular fracture. Very common disseminated crystals and thin to fine crystalline stringers.

Illustration No. SBR-3846P (Sheet 2 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of oil shale with thin crystalline stringer from 266.7 feet:
266.9	268.5	X-ray - calcite; some quartz, dolomite, analcite. Mudstone: brownish-gray to gray-buff (10YR 4/1-7/1; slight olive tint to almost neutral), marly. Massive to very faintly bedded and rare very faint stringers and laminations. Very irregular to slightly irregular parting; very conchoidal fracture. Rare thin irregular pyrite stringers--some vertical.
268.5	269.3	Oil shale, lean: dark brownish-gray to buff (10YR 2/2-7/2). Distinct slightly irregular and distorted to smooth laminations; some loop structures. Slightly irregular to very regular thick shaly parting; conchoidal to irregular fracture. Rare fine black streaks and blebs. Very rare small dark brownish-gray to dark gray lenses.
269.3	270.7	Oil shale, very lean and marlstone: brownish-gray and tan to very light buff (10YR 5/2 and 5/3-8/2, rare 4/2-3/2). Moderately distinct to faint, irregular, distorted, and some displaced to fairly smooth laminations. Regular to very irregular thick parting; irregular fracture. Two thick gray siltstone bands near top. Some irregular vertical fractures. Very rare small dark gray lenses and fine streaks.
270.7	272.6	Oil shale, very lean: dark to light brownish-gray and rare buff (10YR 3/2-6/2, rare 2/2 and 7/2). Moderately distinct slightly irregular and distorted laminations; common small poorly formed loop structures. Slightly irregular thick to medium shaly parting; conchoidal to slightly irregular fracture. Very common fine black streaks and spots (at least some are plant fossils).
272.6	273.9	Oil shale, lean: dark brownish-gray to buff (10YR 2/2-6/3). Faint to moderately distinct, fairly smooth to contorted and displaced laminations. Slightly irregular to very irregular thick parting; conchoidal to irregular fracture. A very vuggy and fractured zone with crystalline calcite in contorted shale in middle part.
273.9	279.4	Oil shale, lean: dark and rare medium to light brownish-gray (10YR 2/2-3/2, rare 4/2-6/2). Very faint and rare moderately distinct, irregular and distorted to some fairly smooth laminations. Slightly irregular thick shaly parting; conchoidal to some irregular fracture. Rare small black lenses and streaks in upper part. Some vuggy fractured zones with crystalline calcite from 275.4 to 276.8 feet. Rare black fossil fragments on parting surfaces.

Illustration No. SBR-3846P (Sheet 3 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
279.4	294.6	Oil shale, lean: dark to light brownish-gray and some buff (10YR 2/2-6/2, some 6/3-7/2). Very faint to rare moderately distinct, very irregular, and contorted to some fairly smooth laminations; rare massive. Very irregular to some slightly irregular thick parting; irregular to conchoidal fracture. Common gritty to vuggy fractured zones with calcite. Some light gray to buff-white silty limestone stringers from 289.2 to 290.1 feet.
294.6	296.8	Mudstone: white to light gray (8.5-7N, rare 6N), earthy to chalky. Very faintly mottled and streaked to massive. Very irregular parting and fracture. Sharp wavy contact with oil shale at top.
		Sample of white mudstone from 295.0 feet: X-ray - quartz, analcite, feldspar, dolomite.
296.8	300.0	Siltstone and mudstone: medium to light gray (5.5-7.5N; some very slight brown tint). Faintly banded to very faint streaked bedding. Slightly irregular to very irregular thick parting; slightly irregular fracture. Some thick to very thin, slightly irregular and distorted to smooth lean oil-shale bands in upper part. Some vertical fractures with rare crystalline pyrite.
300.0	309.4	Mudstone: very light gray (7.5-7N, rare 6N), calcareous. Very faintly mottled and streaked to massive. Very irregular parting; irregular to conchoidal fracture. Common to rare irregular shreds, stringers, and bands of oil shale and marlstone. Very rare irregular fine-grained pyrite stringers.
309.4	311.0	Mudstone, marlstone, and lean oil shale: light gray mudstone (7-6N; some slight brown tint) and brownish-gray to rare buff-white oil shale and marlstone (10YR 5/2-7/2, rare 8/2). Thick irregular bands of faintly streaked to massive mudstone and irregularly laminated marlstone and oil shale. Slightly irregular parting and fracture. Rare irregular fine-grained pyrite masses.
311.0	335.0	Mudstone and siltstone: light to medium gray and rare white (7-5.5N, rare 5N and 7.5-8.5N; some slight brown tint), slightly calcareous to calcareous. Faintly streaked to massive and rare irregularly laminated. Slightly irregular to very irregular parting; fairly smooth to very conchoidal and some very irregular fracture. Some to rare irregular bands, stringers, and shreds of marlstone and oil shale. <u>Some large irregular vugs and spongy brecciated zones in middle part.</u> Some very uneven sample split.

Illustration No. SBR-3846P (Sheet 4 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
335.0	337.7	Oil shale, lean to medium: light to dark olive-gray and rare buff (2.5Y 6/2-3/2, some 2/2, rare 6/3-7/2), calcareous to dolomitic. Faint irregular distorted laminations at top to faint distorted streaked bedding at base. Slightly irregular to very irregular, thick to medium parting; irregular to very conchoidal fracture. Some fine calcite-filled fractures and rare large crystalline calcite masses in upper part; rare thin to fine calcite stringers and filled fractures in lower part. Very rare plant fossils (?) on parting surfaces. Very badly broken up from 337.0 to 337.4 feet; some light gray mudstone fragments (may be out of place); very uneven sample split. Sample of large crystalline calcite mass from 335.6 feet: X-ray - calcite.
337.7	339.0	Oil shale, medium: dark and rare medium olive-gray (2.5Y 3/2-2/2, rare 4/2-5/2), dolomitic. Faint distorted streaked bedding and some slightly contorted and displaced laminations. Irregular to some slightly irregular thick parting; conchoidal to some very irregular fracture. A thick fractured zone with vitreous black bitumen fillings and some crystalline calcite in lower part.
339.0	339.8	Oil shale, very rich: olive-black and rare dark olive-gray (2.5Y 1/2, rare 2/2-3/2). Massive with rare to very common <u>very</u> fine interlacing fractures with some calcite and very rare bitumen fillings. Irregular parting; conchoidal to slightly irregular fracture. Sample of rich massive oil shale from 339.3 feet: X-ray - dolomite, calcite, quartz, analcite, feldspar.
339.8	341.4	Oil shale, lean: dark to medium brownish-gray (10YR 2/2-4/2), very calcareous. Very faint irregular, distorted and displaced to fairly smooth laminations; very rare small loop structures. Regular to some irregular thick shaly parting; conchoidal fracture. Common calcite-filled fractures near top. Rare resinous to dull black coatings on parting surfaces in lower part.
341.4	342.4	Oil shale, very lean: medium to rare dark brownish-gray and buff (10YR 4/2-6/2, rare 3/2 and 7/2), calcareous. Very faint to faint, fairly smooth to slightly irregular and distorted laminations; rare small poorly-formed loop structures. Slightly irregular thick shaly parting; slightly conchoidal and some very irregular fracture. Common fine calcite-filled fractures in middle part.

Illustration No. SBR-3846P (Sheet 5 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
342.4	344.0	Siltstone, mudstone, and very lean oil shale: medium to light gray siltstone and mudstone (5-6.5N) and buff to brownish-gray and brown oil shale (10YR 7/2-4/2 and 4/3). Massive to very faintly streaked clastics and thick bands of smoothly laminated oil shale with some loop structures. Regular to slightly irregular thick parting; slightly conchoidal fracture.
344.0	348.6	Oil shale, very lean to lean: medium to dark brownish-gray and rare buff (10YR 4/2-2/2, rare 5/2-7/2; some very slight olive tint), calcareous. Moderately distinct to very faint, slight irregular, distorted and displaced laminations; some loop structures near top. Regular to very irregular thick parting; conchoidal to some irregular fracture. Some fine calcite-filled fractures and spongy to earthy porous zones with calcite.
348.6	350.6	Oil shale, lean: dark to medium brownish-gray and rare buff (10YR 3/2-5/2, rare 6/3), calcareous. Massive with very common fine vuggy calcite streaks. Irregular thick parting; slightly irregular to conchoidal fracture. Some fractures with calcite and rare black bitumen fillings in lower half.
350.6	353.1	Oil shale, lean: dark to medium brownish-gray (10YR 3/2-4/2), calcareous. Very faintly bedded to faint slightly irregular and distorted laminations; rare loop structures in lower part. Slightly irregular to very irregular thick parting; conchoidal to very irregular fracture. Some fine fractures and spongy to very vuggy zones with calcite.
353.1	356.9	Oil shale, lean and some siltstone: dark brownish-gray to buff oil shale (10YR 3/2-6/3, rare 2/2) and medium to light gray siltstone (5-6.5N). Moderately distinct irregular distorted laminations with thin to thick (up to 0.4 foot) massive siltstone bands. Regular to some very irregular, medium to thick shaly parting; irregular to conchoidal fracture. A large crystalline calcite mass at 355.6 feet.
356.9	358.9	Oil shale, lean: medium to dark brownish-gray and some buff (10YR 5/2-3/2, some 2/2 and 6/2-6/3), calcareous. Distinct slightly irregular and distorted laminations; common loop structures. Slightly irregular thick shaly parting; conchoidal fracture. Rare small gray analcite lenses in lower part.

Illustration No. SBR-3846P (Sheet 6 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
358.9	360.8	Siltstone and mudstone: light to medium gray (6.5-5.5N), calcareous. Massive with rare thin to thick shreds, stringers, and bands of oil shale. Irregular parting; slightly conchoidal to irregular fracture. Rare fine pyrite blebs.
360.8	362.6	Oil shale, very lean: dark brownish-gray to buff (10YR 2/2-7/2), slightly calcareous to very calcareous. Distinct to faint, fairly smooth to irregular, distorted, and displaced laminations; common small loop structures in upper part. Regular to some irregular thick shaly parting; conchoidal to irregular fracture. Two thick gray mudstone bands in middle part.
362.6	365.9	Oil shale, medium to rich: dark and rare medium brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2-4/2 in upper part), slightly calcareous. Very faint contorted to distorted streaks, lenses, and rare laminations. Slightly irregular to irregular thick parting; irregular to conchoidal fracture. A very large irregular vug with some crystalline calcite and rare bitumen at top. <u>Very common</u> fine spongy calcite streaks in lower 0.3 foot. Sample of rich oil shale from 365.3 feet: X-ray - dolomite, calcite, quartz, analcite, feldspar.
365.9	367.4	Oil shale, lean: dark to medium brownish-gray and some buff (10YR 3/2-5/2, some 6/2-6/3, rare 2/2), very calcareous. Faint to moderately distinct, smooth to slightly irregular and distorted laminations. Slightly irregular thick shaly parting; conchoidal to fairly smooth fracture. Rare fine calcite-filled fractures.
367.4	370.9	Siltstone and mudstone: medium to light gray (5-7N; slight brown tint), very calcareous. Massive with common to rare contorted oil-shale shreds, stringers, and bands. Irregular parting; slightly irregular to conchoidal fracture. Rare fine black organic flecks and streaks.
370.9	373.7	Oil shale, very lean: dark brownish-gray to buff (10YR 2/2-7/2), calcareous. Very distinct to some faint, irregular and distorted to some fairly smooth laminations; common loop structures. Slightly irregular thick shaly parting; irregular to conchoidal fracture. Very rare <u>black fossil fragments</u> on parting surfaces.

Illustration No. SBR-3846P (Sheet 7 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
373.7	374.8	Oil shale and mudstone: medium to light brownish-gray and some buff slightly calcareous oil shale (10YR 4/2-6/2, some 6/3-7/2); medium to light gray, calcareous mudstone (5.5-7N; slight brown tint). Moderately distinct slightly irregular distorted laminations and some thick massive bands. Slightly irregular thick shaly parting; irregular to conchoidal fracture.
374.8	376.3	Siltstone: light gray (6-7N; slight brown tint), slightly calcareous. Massive with common fine black flecks and rare lean oil-shale shreds. Irregular parting; slightly irregular to slightly conchoidal fracture.
376.3	380.2	Oil shale, mudstone and siltstone: medium and rare dark brownish to buff oil shale (10YR 4/2-7/2, rare 3/2-8/2); medium to light gray mudstone and siltstone (5-6N, some 7N; some almost brownish-gray). Moderately distinct to faint, irregular and slightly distorted to rare slightly contorted laminations in oil shale; very thick to thin bands of massive mudstone and siltstone with rare oil-shale stringers and shreds. Irregular and rare regular thick parting; slightly irregular to conchoidal fracture. Rare small pyrite blebs.
380.2	382.4	Oil shale, very lean: dark brownish-gray to buff (10YR 3/2-7/2), calcareous to slightly calcareous. Moderately distinct smooth to irregular and slightly distorted laminations; rare poorly formed loop structures. Slightly irregular thick to medium shaly parting; conchoidal fracture. Rare thin to fine gray siltstone stringers.
382.4	383.5	Siltstone: medium to light gray (5.5-6N; slight brown tint), calcareous. Massive with some very faint streaks. Irregular parting; slightly irregular to slightly conchoidal fracture. Rare fine black flecks. Very rare oil shale and marlstone stringers and shreds.
383.5	388.0	Oil shale and some mudstone: medium and some dark brownish-gray to buff calcareous oil shale (10YR 4/2-6/2, some 3/2 and 6/3-7/2); light to medium gray calcareous mudstone (7.5-5N; slight brown tint). Moderately distinct fairly smooth to irregular, distorted and rare contorted laminations in oil shale; thick irregular massive stringers of mudstone with contorted and broken oil-shale stringers and shreds. Regular to some irregular thick shaly parting; conchoidal to slightly irregular fracture. Very rare black <u>plant fossils</u> on parting surfaces.

Illustration No. SBR-3846P (Sheet 8 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
388.0	389.2	Siltstone and mudstone: light to medium gray (6-5.5N; slight brown tint), slightly calcareous. Massive with some fine light and dark specks. Irregular parting; slightly irregular fracture. Rare thin to fine oil-shale stringers.
389.2	392.5	Oil shale, very lean: medium and some dark brownish-gray to buff (10YR 4/2-6/2, some 3/2 and 6/3-7/2), slightly calcareous to calcareous. Moderately distinct irregular and slightly distorted laminations; common poorly formed loop structures. Slightly irregular to some irregular thick shaly parting; slightly irregular to conchoidal fracture. Rare small gray analcite lenses. A 0.1-foot light gray mudstone band with some oil-shale shreds at 890.7 feet.
392.5	393.5	Mudstone and siltstone: light to medium gray (6-5N; some almost brownish-gray), calcareous. Very faintly streaked to massive. Irregular parting; conchoidal fracture. Rare thin to fine oil-shale stringers. Very rare fine pyrite stringers and blebs.
393.5	397.7	Oil shale and some marlstone: dark brownish-gray to buff (10YR 3/2-7/2), calcareous. Fairly distinct to some very faint, irregular and slightly distorted laminations; common loop structures. Slightly irregular to some very irregular thick shaly parting; irregular to conchoidal fracture. Very rare small gray pyritic lenses.
397.7	399.6	Oil shale, medium: brownish-black to medium brownish-gray (10YR 1/2-4/2), slightly calcareous to dolomitic. Faint irregular distorted streaks and stringers to <u>very</u> faint streaked bedding and rare irregular and slightly distorted laminations. Irregular parting; slightly irregular to conchoidal fracture. A thin irregular buff calcareous stringer near base.
399.6	400.3	Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2), dolomitic to slightly calcareous. <u>Very</u> faint fairly smooth laminations. Irregular to regular thick parting; slightly conchoidal to some hackly fracture; some are slightly elastic and tough.
400.3	405.4	Oil shale, lean to very lean: dark brownish-gray to buff and rare buff-white (10YR 3/2-6/3, rare 2/2 and 7/2-8/2), calcareous. Faint to very distinct, fairly smooth to slightly irregular, distorted and rare displaced laminations; some to common loop structures. Regular to some irregular thick shaly parting; conchoidal fracture. A 1-inch light gray faintly bedded silty textured tuff band at 400.8 feet. Rare thin granular bitumen impregnated analcite stringers in lower half (like Corehole 1, 526.9 feet).

Illustration No. SBR-3846P (Sheet 9 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
405.4	407.3	Oil shale, medium: medium to dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2), slightly calcareous to dolomitic. Moderately distinct irregular distorted laminations to <u>very</u> faint streaked bedding; rare moderately large loop structures. Slightly irregular thick shaly parting; slightly conchoidal to very conchoidal fracture. Some thin to fine, tan to buff tuff stringers and laminae in upper part. A smooth vertical fracture with very thin white calcite crusts runs from 406.3 to 407.3 feet.
407.3	421.8	Oil shale, lean: dark to light brownish-gray (10YR 3/2-6/2; some very slight olive tint), calcareous to slightly calcareous. Very faint fairly smooth to irregular distorted laminations and some very faintly bedded to massive. Slightly irregular to very irregular thick parting; conchoidal to some very irregular fracture. Common vuggy fractured zones with drusy calcite and rare pyrite. Some very uneven sample split.
421.8	422.8	Oil shale, lean: dark brownish-gray (10YR 2/2-3/2), calcareous. Massive to <u>very</u> faint smooth laminations. Irregular to slightly irregular thick parting; conchoidal fracture. Rare fine crystalline calcite streaks. Very rare black fossil fragments (?) on parting surfaces.
422.8	425.3	Oil shale, lean: medium to dark brownish-gray (10YR 4/2-3/2, rare 5/2; some very slight olive tint), calcareous. Very faint smooth laminations to massive. Slightly irregular to very irregular thick parting; conchoidal to irregular fracture. Very common thin to <u>fine</u> vuggy calcite streaks and stringers in middle part.
425.3	426.3	Oil shale, lean: dark to medium and some light brownish-gray (10YR 2/2-4/2, some 5/2-6/2), calcareous. Very faint to moderately distinct, smooth to slightly irregular and distorted laminations, some small loop structures. Slightly irregular to regular, thick to medium shaly parting; conchoidal to irregular fracture.
426.3	430.6	Oil shale, very lean: medium and rare dark brownish-gray to buff (10YR 4/2-7/2, rare 3/2-2/2), calcareous. Distinct to faint, slightly irregular and distorted laminations; common loop structures. Slightly irregular thick shaly parting and conchoidal fracture in upper part; <u>very</u> conchoidal fracture and no prominent parting in lower part. Rare buff to gray analcite stringers. Core completely shattered into sharp irregular pieces from 427.5 to 430.6 feet; grab sampled.

Illustration No. SBR3846P (Sheet 10 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
430.6	433.5	Oil shale, lean: medium to dark and rare light brownish-gray and brown (10YR 5/2 and 5/3-3/2, rare 2/2 and 6/2), calcareous. Very faint to faint, smooth to irregular and slightly distorted laminations; some loop structures. Slightly irregular medium to thick shaly parting; conchoidal fracture. Rare thin to fine, gray to brownish-gray crystalline stringers and lenses with very rare pyrite. Some fine calcite-filled fractures near base. Sample of oil shale with gray to brownish-gray stringers from 431.7 feet: X-ray - analcite, feldspar, dolomite, quartz, calcite, pyrite.
433.5	438.3	Oil shale, lean to medium: dark brownish-gray to brownish-black (10YR 3/2-1/2), calcareous to slightly calcareous. <u>Very</u> faint slightly irregular and distorted laminations to massive. Regular to some irregular thick shaly parting; conchoidal fracture. A slightly irregular vertical fracture with very thin calcite crusts runs from 435.7 to 437.3 feet. Common very fine irregular intersecting fractures with some crystalline calcite from 437.7 to 438.2 feet. A fairly large vug with some calcite and bitumen fillings at base.
438.3	439.3	Oil shale, lean: medium to light and rare dark brownish-gray (10YR 4/2-6/2, rare 3/2), calcareous. Moderately distinct irregular and slightly distorted to smooth laminations. Slightly irregular thick to medium shaly parting; slightly conchoidal fracture. Two thin zones of fine disseminated calcite crystals near top.
439.3	441.5	Oil shale, lean: dark to medium brownish-gray and brown (10YR 3/2-5/2 and 5/3), very calcareous. Very faint fairly smooth laminations to very faintly bedded and some massive. Regular to some very irregular thick shaly parting; slightly conchoidal to very conchoidal fracture. Rare thin irregular buff crystalline calcite stringers and streaks.
441.5	443.5	Oil shale, very lean: medium to light brownish-gray and rare buff (10YR 4/2-6/2, rare 7/2), calcareous to slightly calcareous. Faint to distinct, fairly smooth to irregular distorted laminations; some loop structures. Very regular to rare irregular thick shaly parting; conchoidal fracture. Some smooth vertical fractures with very thin white to slightly pink calcite crusts. A 0.1-foot zone of very common fine disseminated calcite and bitumen streaks at 441.8 feet. Sample of oil shale with very fine disseminated calcite and bitumen streaks from 441.8 feet: X-ray - quartz, dolomite, calcite, analcite, feldspar.

Illustration No. SBR-3846P (Sheet 11 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
443.5	445.3	Oil shale, lean: dark brownish-gray and dark brown (10YR 2/2-3/2 and 3/3), very calcareous. Very faint to faint, slightly irregular and distorted laminations. Slightly irregular to very irregular thick parting; very conchoidal fracture. A smooth vertical fracture with some calcite crusts runs the length of the sample.
445.3	446.8	Oil shale, lean: medium and some dark brownish-gray to tan and rare buff (10YR 4/2-5/3, some 3/2-2/2, rare 6/3), calcareous. Faint to some moderately distinct, irregular and slightly distorted laminations; some common small loop structures. Slightly irregular to some irregular thick shaly parting; conchoidal fracture. Very rare vitreous black plant fossils on parting surfaces.
446.8	447.8	Oil shale, medium: dark brownish-gray to brownish-black (10YR 3/2-1/2), some satiny luster, very calcareous to slightly calcareous. Very faint to faint, smooth to some slightly irregular and distorted laminations; rare loop structures. Regular to slightly irregular thick shaly parting; conchoidal to smooth fracture.
447.8	449.8	Oil shale, medium to lean: dark brownish-gray and some dark brown (10YR 3/2-2/2, some 3/3), slightly calcareous to calcareous. Very faint to faint, smooth to some irregular distorted laminations; rare loop structures in upper part. Slightly irregular thick shaly parting; conchoidal to irregular fracture. Very rare black plant fossils on parting surfaces. Three irregular 1-1/2- to 1/2-inch dark brownish-gray to buff granular tuff stringers at 448.0 to 448.3 feet--some bitumen impregnated.
449.8	450.4	Oil shale, lean: dark to medium brownish-gray and brown (10YR 3/2-5/2 and 5/3, rare 2/2), calcareous. Faint irregular distorted laminations. Slightly irregular medium to thick shaly parting; very conchoidal fracture. Rare thin irregular dark brownish-gray crystalline stringers.
450.4	451.5	Oil shale, lean: medium and some dark brownish-gray to tan and buff (10YR 4/2-6/3 and 7/2, some 3/2), calcareous. Moderately distinct to very distinct, irregular, distorted and some displaced to smooth laminations; common poorly-formed loop structures. Slightly irregular thick shaly parting; conchoidal to smooth fracture. Very rare fine gray to brownish-gray crystalline stringers.

Illustration No. SBR-3846P (Sheet 12 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
451.5	452.5	Oil shale, lean: medium to dark brownish-gray and some brownish-black (10YR 5/2-3/2, some 2/2-1/2), slightly calcareous to dolomitic. Faint to very faint, smooth to irregular and distorted laminations; some distinct irregular medium to thin brownish-black bands. Regular to irregular thick parting; conchoidal fracture.
452.5	453.5	Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2), dolomitic. Faint to very faint, irregular and distorted to smooth laminations. Slightly irregular to very irregular thick parting; conchoidal and some hackly fracture. Rare thin irregular dark brown buff stringers. A smooth diagonal fracture with some calcite crusts and fine pyrite crystals in middle part.
453.5	454.5	Oil shale, medium: dark brownish-gray to some brownish-black (10YR 2/2-3/2, some 1/2), rare very slight resinous luster, calcareous. Very faint slightly irregular and distorted to some smooth laminations. Regular to slightly irregular thick shaly parting; very conchoidal fracture.
454.5	455.5	Oil shale, lean: dark to medium brownish-gray (10YR 3/2-5/2, some 2/2), calcareous. Faint to distinct, slightly irregular and distorted lamination. Irregular thick parting; very conchoidal fracture.
455.5	459.1	Oil shale, lean: medium and some dark brownish-gray to buff (10YR 4/2-6/2 and 6/3, some 3/2, rare 2/2), calcareous. Distinct to some faint irregular distorted laminations. Irregular to slightly irregular thick parting; very conchoidal to some smooth fracture. Very rare fine pyrite streaks. A 1/2-inch irregular dense brownish-gray crystalline stringer at 458.9 feet. Sample of brownish-gray crystalline stringer from 458.9 feet: X-ray - feldspar, analcite.
459.1	462.2	Oil shale, medium: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2), rare very slight resinous luster, slightly calcareous. Very faint irregular distorted laminations to some massive. Slightly irregular to very irregular thick parting; irregular to very conchoidal fracture.
462.2	463.2	Oil shale, medium: dark brownish-gray to some brownish-black (10YR 3/2-2/2, some 1/2), some slight resinous luster in lower part, calcareous to dolomitic. Faint fairly smooth to irregular distorted laminations. Regular to some irregular thick shaly parting; conchoidal to some very slight hackly fracture. A very thin dense dark brownish-gray crystalline stringer at 462.9 feet (like 458.9 feet).

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
463.2	467.3	Oil shale, rich to medium: dark brownish-gray to brownish-black (10YR 2/1-1/2, rare 3/2), some resinous to waxy luster in upper part, rare very slight resinous luster in other parts, dolomitic to calcareous. Very faint irregular and distorted to smooth laminations and some faintly bedded to massive. Very irregular to some regular thick parting; very conchoidal and rare slight hackly fracture. Common <u>very</u> fine interlacing fractures with some calcite from 465.0 to 465.8 feet.
467.3	470.0	Oil shale, lean: medium to dark brownish-gray and very rare brownish-black (10YR 4/2-2/2, rare 1/2), calcareous. Faint to moderately distinct, smooth to slightly irregular and distorted laminations. Regular to irregular, thick to medium parting; irregular to very conchoidal fracture.
470.0	487.0	Oil shale, medium: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2), very calcareous to rare slightly calcareous, rare very slight resinous luster. Very faint smooth to some irregular distorted laminations. Slightly irregular to some very irregular thick shaly parting; very conchoidal to irregular and rare smooth fracture. Rare medium to thin dark brownish-gray to tan crystalline tuff stringers and lenses--some bitumen impregnated. Sample of thin bitumen-impregnated tuff from 473.4 feet: X-ray - feldspar, dolomite, analcite, quartz, calcite. Sample of small dark brownish-gray crystalline lens from 483.2 feet: X-ray - calcite, analcite, fluorite; some feldspar, quartz.
487.0	493.8	Oil shale, medium to lean: dark to medium brownish-gray and some dark to medium brown, rare brownish-black (10YR 2/2-4/2, some 3/3-5/3, rare 1/2), rare resinous luster near top, very calcareous to slightly calcareous. Distinct to very faint, slightly irregular and distorted to smooth laminations; rare loop structures. Very regular to rare irregular thick shaly parting; conchoidal to fairly smooth fracture. Some very fine buff to tan streaks, lenses, and rare laminae. Some thin irregular light gray to buff bitumen-impregnated granular tuffs in lower half (like core 1, 616.4 feet).

Illustration No. SBR-3846P (Sheet 14 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
493.8	496.0	Oil shale, medium: dark brownish-gray and rare brownish-black (10YR 3/2-2/2, rare 1/2), calcareous to slightly calcareous. Very faint smooth to slightly irregular and distorted laminations. Slightly irregular to irregular thick parting; conchoidal to some fairly smooth fracture.
496.0	497.9	Oil shale, medium: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2), slightly calcareous. Very faint to faint, slightly irregular and distorted laminations. Slightly irregular thick shaly parting; conchoidal fracture. Very rare very small brown dolomite lenses.
497.9	499.9	Oil shale, medium: dark to medium brownish-gray (10YR 3/2-4/2, rare 2/2 and 5/2), slightly calcareous. Very faint to faint, slightly irregular and distorted to some smooth laminations; some small indistinct loop structures near top. Slightly irregular to some regular thick shaly parting; conchoidal and some irregular to smooth fracture. Rare fine gray pyritic streaks and lenses. Very rare vitreous black plant fossils on parting surfaces.
499.9	500.9	Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2), some slight resinous luster, slightly calcareous. Faint to very faint, very irregular and distorted laminations. Irregular to slightly irregular thick parting; conchoidal fracture. A 1-1/4- to 1-3/4-inch irregular light brownish-gray to white granular tuff with some fine shale stringers and small bitumen spots at 500.0 feet. Sample of light brownish-gray to white tuff from 500.0 feet: X-ray - quartz, feldspar, analcite, pyrite.
500.9	501.9	Oil shale, medium: dark to rare medium brownish-gray and brownish-black (10YR 3/2-2/2, rare 4/2 and 1/2), slightly calcareous to calcareous. Faint slightly irregular and distorted to some smooth laminations. Regular to slightly irregular thick shaly parting; conchoidal to fairly smooth fracture; some slightly elastic and tough.
501.9	502.9	Oil shale, medium: dark to medium brownish-gray and brown (10YR 2/2-5/2 and 5/3), slightly calcareous. Faint and rare moderately distinct, fairly smooth to irregular distorted laminations; some loop structures (very large ones near base). Slightly irregular to irregular thick parting; conchoidal fracture. A very irregular thin brownish-gray crystalline stringer near base.

Illustration No. SBR-3846P (Sheet 15 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
502.9	504.9	Oil shale, rich to medium: dark brownish-gray to buff and very rare brownish-black (10YR 2/2-6/3 and 7/2, rare 1/2), very rare resinous luster, slightly calcareous to dolomitic. Distinct intricately contorted and folded to some slightly distorted and displaced laminations. Irregular thick parting; irregular to conchoidal fracture. Common very irregular thin to fine, dark brownish-gray to buff vuggy crystalline stringers with fine dark specks in middle and lower parts. Sample of contorted shale with fine buff crystalline stringers from 503.9 feet: X-ray - dolomite, calcite, quartz, feldspar, analcite.
504.9	511.2	Oil shale, medium to lean: dark to some light brownish-gray and very rare brownish-black (10YR 2/2-5/2, some 6/2, rare 1/2), slightly calcareous and some dolomitic. Moderately distinct to very faint, slightly irregular and distorted to smooth laminations; some small displacements and poorly-formed loop structures. Regular to slightly irregular thick shaly parting; slightly conchoidal fracture. Some thin to fine, gray to buff and rare dark brownish-gray crystalline stringers.
511.2	512.1	Oil shale, medium: dark and very rare medium brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2-4/2), dolomitic to slightly calcareous. Very faint and rare distinct, smooth to some slightly irregular and distorted laminations; rare small loop structures. Slightly irregular to regular thick shaly parting; slightly conchoidal to smooth fracture. Some very fine pyrite streaks and flecks--especially in lower half.
512.1	513.1	Oil shale, lean: dark to medium brownish-gray and rare brownish-black (10YR 2/2-4/2, rare 1/2), dolomitic to slightly calcareous. Very faint to faint, slightly irregular and distorted laminations; common small loop structures. Slightly irregular to regular, thick to medium shaly parting; conchoidal fracture. Very rare very fine gray pyritic streaks. A very thin slightly irregular brownish-gray to buff dense crystalline stringer near top.
513.1	515.1	Oil shale, lean: dark brownish-gray to buff (10YR 2/2-7/2), slightly calcareous to calcareous. Faint to very distinct, slightly irregular and distorted to very smooth laminations; some loop structures in upper part. Slightly irregular to regular thick shaly parting; conchoidal fracture. Some very fine buff lenses and streaks in upper part. Very rare fine pyrite streaks.

Illustration No. SBR-3846P (Sheet 16 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
515.1	516.3	Oil shale, lean: dark to some light brownish-gray and rare brownish-black (10YR 2/2-4/2, some 5/2-6/2, rare 1/2), calcareous to slightly calcareous. Distinct to some faint, very smooth to slightly irregular and distorted laminations; some loop structures. Slightly irregular to regular thick shaly parting; slightly conchoidal fracture. Very rare thin irregular dark brownish-gray to buff crystalline stringers. Very rare vitreous black plant fossils (?) on parting surfaces.
516.3	517.8	Oil shale, rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2), common satiny to slight resinous luster, dolomitic. <u>Very</u> faint slightly irregular and distorted to very smooth laminations. Very regular to slightly irregular, thick to medium shaly parting; smooth to conchoidal and rare very slight hackly fracture, some slightly elastic and tough. An irregular 1/2- to 3/4-inch, brownish-gray to buff silty-textured crystalline tuff at 516.9 feet. Some <u>very</u> fine pyrite streaks and blebs in lower part. Sample of buff silty-textured tuff from 516.9 feet: X-ray - feldspar, quartz, analcite, illite, dolomite.
517.8	518.8	Oil shale, medium: brownish-black to dark and rare medium brownish-gray and brown (10YR 1/2-3/2 and 3/3, rare 4/2-4/3), slightly calcareous. Very faint to faint, slightly irregular and distorted to some smooth laminations; rare small poorly-formed loop structures. Slightly irregular to regular, thick to medium shaly parting; conchoidal fracture. Rare <u>very</u> fine pyrite streaks and blebs.
518.8	520.8	Oil shale, lean: dark to medium brownish-gray (10YR 2/2-4/2, some 5/2), slightly calcareous. Very faint to faint, irregular and slightly distorted to some smooth laminations; some loop structures. Slightly irregular to regular, thick to some medium shaly parting; conchoidal fracture. Rare fine gray streaks and laminae. Some very fine pyrite streaks and blebs in lower part. Common black to brown fossil fragments on parting surfaces.

Illustration No. SBR-3846P (Sheet 17 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
520.8	522.4	Oil shale, lean: dark brownish-gray to tan and rare buff (10YR 2/2-6/2 and 6/3, rare 7/2), slightly calcareous to calcareous. Faint to some moderately distinct, slightly irregular, distorted, and commonly displaced laminations; some loop structures. Regular to some irregular thick shaly parting; slightly conchoidal fracture. Common dark brown fissile fragments on some parting surfaces. A very irregular thin dense gray crystalline stringer at 521.5 feet. A thin irregular buff-white to rare gray earthy stringer at 521.9 feet. Sample of thin buff-white to gray earthy stringer from 521.9 feet: X-ray - analcite, quartz.
522.4	523.4	Oil shale, lean: dark brownish-gray and dark brown to brownish-black (10YR 3/2 and 3/3-1/2), slightly calcareous. Very faint smooth to slightly irregular and distorted laminations; rare poorly-formed loop structures. Regular to some irregular thick shaly parting; smooth to conchoidal fracture. Very rare very fine pyrite blebs.
523.4	529.3	Oil shale, lean: dark to some light brownish-gray and rare buff (10YR 2/2-5/3, some 6/2, rare 7/2), very calcareous to slightly calcareous. Moderately distinct to very faint, slightly irregular and distorted to some smooth laminations; common to rare loop structures. Regular to rare irregular thick shaly parting; conchoidal and rare irregular fracture. Common fossil fragments on parting surfaces. Rare very thin brownish-gray to buff and light gray crystalline stringers. Rare fine gray pyritic streaks.
529.3	530.3	Oil shale, lean: dark brownish-gray to buff and very rare brownish-black (10YR 3/2-6/3 and 7/2, rare 2/2-1/2), slightly calcareous to very calcareous. Faint to moderately distinct, slightly irregular, distorted and some displaced to smooth laminations; common small loop structures. Slightly irregular thick shaly parting; conchoidal to fairly smooth fracture. Rare very thin irregular dark to light gray crystalline stringers. Rare fossil fragments on parting surfaces. Very sharp smooth contact with richer shale below.

Illustration No. SBR-3846P (Sheet 18 of 49)

Laramie Petroleum Research Center, Laramie, Wyoming

August 17, 1964

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
530.3	531.8	Oil shale, rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2), slightly calcareous to dolomitic. <u>Very</u> faint slightly distorted to smooth streaked bedding and some irregular, distorted stringers and laminations. Regular to slightly irregular thick shaly parting; very smooth to slightly conchoidal fracture. Rare very fine dark gray pyritic (?) streaks. Some very thin dark brown to tan bitumen-impregnated granular analcite stringers near base.
531.8	536.9	Oil shale, lean: dark to rare light brownish-gray, some brownish-black in upper foot (10YR 3/2-5/2, some 2/2-1/2, rare 6/2), calcareous to some dolomitic. Moderately distinct to very faint, slightly irregular and distorted to some smooth laminations; some to rare small loop structures. Regular to rare irregular thick shaly parting; conchoidal and some irregular fracture. Common black to dark brown fossil fragments on parting surfaces. Some to rare fine buff to tan earthy streaks and lenses. A zone of 1/2- to 1/8-inch, light gray to white dense dolomitic crystalline lenses at 533.8 feet; a 1-1/2-inch irregular light gray to white and rare brown dolomitic crystalline band at 534.3 feet. Sample of thick light gray crystalline band from 534.3 feet: X-ray - dolomite, feldspar, analcite, some quartz.
536.9	537.9	Oil shale, lean: dark to medium brownish-gray and some buff (10YR 3/2-5/3, some 6/3, rare 2/2), calcareous. Faint to distinct, slightly irregular and distorted laminations; common small displacements and poorly-formed loop structures in lower part. Regular to rare irregular, medium to thick shaly parting; conchoidal to some irregular fracture. Very rare fine buff earthy streaks and lenses. Some fossil fragments on parting surfaces. A very thin irregular light gray crystalline stringer at 537.0 feet (like 534.3 feet).
537.9	538.4	Oil shale, lean: dark to rare medium brownish-gray and brown, very rare brownish-black (10YR 3/2 and 3/3-2/2, rare 4/2 and 1/2), calcareous to slightly calcareous. Faint to very faint, slightly irregular and distorted to smooth laminations. Slightly irregular thick shaly parting; slightly conchoidal fracture. Some <u>fossil</u> fragments on parting surfaces.

Illustration No. SBR-3846P (Sheet 19 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
538.4	539.0	Oil shale, rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, some 3/2), common satiny to resinous luster in upper 0.3 foot, dolomitic. <u>Very</u> faint smooth bedding to faint slightly irregular and distorted laminations. Slightly irregular thick shaly parting; smooth to slight hackly fracture. Very rare small dense dark brown dolomite lenses.
539.0	541.8	Oil shale, medium to lean: dark brownish-gray with some brownish-black in upper part and some dark to medium brown in lower part (10YR 2/2-3/2, some 1/2 and 3/3-4/3), slightly calcareous to very calcareous. Faint to very faint irregular and distorted to some fairly smooth laminations; rare very faint poorly-formed loop structures. Slightly irregular to some very irregular thick shaly parting; irregular to very conchoidal fracture. Some fossil fragments on parting surfaces. Rare thin to fine brownish-gray crystalline lenses and stringers.
541.8	542.8	Oil shale, lean: dark to rare medium brownish-gray and brown (10YR 3/2 and 3/3-2/2, rare 4/2), calcareous. Very faint to faint, slightly irregular and distorted laminations. Irregular to slightly irregular thick parting; very conchoidal fracture. Very rare thin brownish-gray crystalline stringers.
542.8	544.6	Oil shale, lean: dark brownish-gray and brown to tan and rare buff (10YR 3/2 and 3/3-6/3, rare 2/2 and 7/2), calcareous. Faint to very distinct irregular distorted laminations; common loop structures. Slightly irregular to very irregular thick parting; very conchoidal fracture. Some very irregular thin to fine, light gray to white crystalline stringers and lenses (like 534.3 feet).
544.6	545.4	Oil shale, medium: brownish-black to dark and rare medium brownish-gray (10YR 1/2-3/2, rare 4/2), dolomitic to slightly calcareous. Thick very faintly bedded brownish-black bands at 544.6-544.8 and 545.1-545.3 feet; very faint to faint, fairly smooth to irregular and distorted laminations in other parts. Irregular thick parting; conchoidal fracture.
545.4	546.0	Oil shale, rich: brownish-black and some dark brownish-gray (10YR 1/2, some 2/2), some very slight resinous luster, dolomitic. <u>Very</u> faint irregular and distorted to smooth laminations and streaked bedding. Slightly irregular thick shaly parting; conchoidal fracture.

Illustration No. SBR-3846P (Sheet 20 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
546.0	547.0	Oil shale, medium: brownish-black to dark brownish-gray and brown (10YR 1/2-3/2 and 3/3), slightly calcareous to calcareous. Very faint to faint, fairly smooth to slightly irregular and distorted laminations; some poorly-formed loop structures. Slightly irregular medium to thick shaly parting; smooth to very conchoidal fracture. Very rare thin brownish-gray crystalline stringers.
547.0	549.5	Oil shale, lean: dark brownish-gray and some dark to medium brown (10YR 3/2-2/2, some 3/3-4/3; some almost neutral in middle part), slightly calcareous and some dolomitic. Faint to very faint, smooth to irregular and slightly distorted laminations. Very regular to rare irregular, medium to thick shaly parting; conchoidal and some very irregular fracture. Rare thin to fine brownish-gray crystalline stringers and streaks--some with common pyrite. Rare fossil fragments on parting surfaces.
549.5	552.0	Oil shale, rich to very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2), rare to very common resinous luster, dolomitic. <u>Very</u> faint streaked bedding to irregular, distorted and some smooth laminations. Slightly irregular to some very regular thick shaly parting; fairly smooth to conchoidal and rare slight hackly fracture. A thin irregular oil-stained light to dark brownish-gray granular porous analcite stringer at 550.4 feet.
552.0	555.2	Oil shale, medium to lean: dark to some medium brownish-gray (10YR 2/2-3/2, some 4/2 in lower part), very calcareous. <u>Very</u> faint streaked bedding to very faint irregular and slightly distorted laminations and streaks. Very irregular thick parting; very conchoidal fracture.
555.2	558.0	Oil shale, lean: dark brownish-gray and brown to tan and buff (10YR 2/2 and 3/3-6/3 and 7/2), very calcareous. Faint to very distinct, irregular, distorted, and displaced laminations; some to very common loop structures. Very irregular to some regular, thick to medium parting; very conchoidal fracture. Very rare fine earthy buff-white to brownish-gray stringers and streaks.
558.0	561.4	Oil shale, lean to medium: dark brownish-gray to some brownish-black, some medium brownish-gray and brown in upper part (10YR 3/2-2/2, some 1/2 and 4/2-4/3), calcareous to very calcareous. Very faint smooth to some slightly irregular and distorted laminations. Slightly irregular thick shaly parting; conchoidal fracture. Thin irregular medium to dark brownish-gray bitumen-impregnated tuff stringers at 558.5, 559.0, 559.1, 560.4, and 561.0 feet.

Illustration No. SBR-3846P (Sheet 21 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of oil shale with bitumen-impregnated tuff stringer from 560.4 feet: X-ray - analcite; some quartz, feldspar, dolomite, calcite.
561.4	565.4	Oil shale, medium: dark to medium brownish-gray and brown (10YR 2/2-4/2 and 4/3, rare 5/3), calcareous to slightly calcareous. Moderately distinct to some very faint, irregular and distorted to some finely smooth laminations; common loop structures. Slightly irregular thick shaly parting; conchoidal to some smooth fracture. Some thin to thick (up to 1-1/2-inch) irregular tan to dark brown bitumen-impregnated tuff stringers--especially in upper 0.8 feet. A 0.2-foot irregular light brownish-gray silty to earthy tuff band with rare very small cavities at 563.6 feet. Sample of thick brown bitumen-impregnated tuff from 561.8 feet: X-ray - analcite, quartz, dolomite, feldspar. Sample of thick light brownish-gray tuff from 563.7 feet: X-ray - analcite, quartz, fluorite, some feldspar.
565.4	567.4	Oil shale, rich to very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2), some resinous luster in upper half, common resinous and rare waxy luster in lower half, dolomitic. Faint to very faint, smooth to some irregular distorted laminations. Regular to some irregular thick shaly parting; conchoidal and rare very slight hackly fracture. Two medium to thick very irregular buff to brownish-black, granular to spongy tuff stringers at 566.9 and 567.1 feet--lower, thicker one is very strongly bitumen impregnated. Sample of 3/4- to 1-1/2-inch impregnated tuff from 567.1 feet: X-ray - analcite, quartz, some feldspar.
567.4	568.9	Oil shale, medium: dark to rare medium brownish-gray and brown (10YR 2/2-3/2 and 3/3, rare 4/3), calcareous. Very faint to faint, smooth to slightly irregular and distorted laminations; some loop structures. Regular to rare irregular, medium to thick shaly parting; conchoidal to irregular fracture. Rare thin to fine, dark brownish-gray to buff crystalline streaks and lenses in upper part. Rare gray laminae in lower part.

Illustration No. SBR-3846P (Sheet 22 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
568.9	569.9	Oil shale, medium: dark brownish-gray and brown to tan and rare buff (10YR 2/2-5/3, rare 6/3), calcareous. Faint to some distinct, slightly irregular, distorted and some displaced laminations; some loop structures. Regular to slightly irregular, thick to medium shaly parting; slightly conchoidal to smooth fracture. Rare very fine pyrite streaks. Some very thin buff earthy to silty streaks and lenses near base.
569.9	571.0	Oil shale and marlstone: medium and rare dark brown to very light buff (10YR 5/3-8/2, rare 4/3-3/3), calcareous. Faint to some very distinct, smooth to some slightly contorted laminations; very rare poorly-formed loop structures. Regular to irregular thick parting; conchoidal fracture. A very irregular 3/4- to 1-3/4-inch, medium to dark brown, dense to granular bitumen-impregnated stringer at 570.7 feet with some very fine fractures and irregular stringers below. Sample of very light buff marlstone from 570.6 feet: X-ray - dolomite, quartz, feldspar (sanidine). Sample of dense to granular brown stringer from 570.7 feet: X-ray - quartz, dolomite, some analcite.
571.0	571.6	Oil shale, lean: medium and dark brown to rare buff and brownish-black (10YR 5/3-3/3, rare 6/3 and 2/2-1/2), slightly calcareous. Faint to some distinct, smooth to very slightly distorted and rare displaced laminations. Slightly irregular to very regular thick shaly parting; slightly conchoidal fracture. Very common thin distorted medium to dark brown, dense to silty textured impregnated stringers in upper 0.1 foot (like 570.7 feet). Rare very fine earthy to chalky, buff to white streaks in middle part.
571.6	572.6	Oil shale, medium: light to dark brownish-gray and some brownish-black (10YR 6/2-2/2, some 1/2), some resinous luster in upper 0.2 foot, dolomitic to slightly calcareous. A 0.2-foot brownish-black band with very faint smooth streaked bedding at top; moderately distinct to very faint, slightly irregular, distorted and displaced laminations with some very small loop structures in other parts. Regular to some irregular, thick to medium shaly parting; conchoidal fracture. A 1/2-inch irregular finely brecciated band with very common interstitial bitumen and some milky white crystalline material at 572.0 feet.

Illustration No. SBR-3846P (Sheet 23 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of brecciated lean oil shale from 572.0 feet:
572.6	574.9	X-ray - quartz, dolomite; some analcite, feldspar. Oil shale, rich to medium: dark brownish-gray and brownish-black (10YR 2/2-1/2), some very slight resinous and very rare waxy luster, dolomitic to calcareous. Very faint very irregular and distorted to some smooth laminations and stringers. Regular to some irregular thick shaly parting; conchoidal and some very slight hackly fracture; some is slightly elastic and tough. Very rare thin irregular dark brownish-gray pyritic stringers.
574.9	575.9	Oil shale, lean: dark brownish-gray and rare brownish-black (10YR 2/2-3/2, rare 1/2), slightly calcareous. Very faint slightly irregular and distorted to some smooth laminations. Slightly irregular to irregular thick parting; conchoidal fracture. Rare very fine brownish-gray to buff crystalline stringers and streaks in lower part.
575.9	577.5	Oil shale, lean: medium to dark brownish-gray and brown (10YR 4/2 and 4/3-3/2 and 3/3, rare 2/2), slightly calcareous. Faint to very faint, slightly irregular and distorted to some smooth laminations; common loop structures in lower part. Slightly irregular to irregular thick parting; conchoidal fracture. Several thin irregular granular to dense crystalline tuff stringers near top. A 1/4- to 1/2-inch strongly impregnated granular tuff stringer at 576.6 feet.
577.5	581.0	Oil shale, medium: dark and rare medium brownish-gray and brown to brownish-black (10YR 3/2 and 3/3-1/2, rare 4/2-4/3), very rare resinous luster in upper part, slightly calcareous to calcareous. Very faint to faint, irregular and distorted to some smooth laminations. Regular to slightly irregular thick shaly parting; conchoidal to some smooth fracture. Thin impregnated granular tuff stringers at 578.2-578.3, 578.5-578.8, 579.1, 579.4, 579.5, and 580.0 feet. Very rare very fine brownish-gray to buff crystalline streaks in middle and lower parts.
581.0	584.4	Oil shale, lean: dark brown to tan and some buff (10YR 3/3-6/3, some 7/2, rare 2/2), very calcareous. Very distinct irregular distorted laminations; very common loop structures. Regular and some irregular thick shaly parting; conchoidal fracture. Some thin irregular buff to white, earthy to chalky calcareous stringers and lenses at 581.3 feet. A very thick dense medium to dark brown tuff at 581.9-582.4 feet (contorted laminae above).

Illustration No. SBR-3846P (Sheet 24 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of brown tuff from 582.0-582.2 feet: X-ray - feldspar (sanidine):
584.4	585.2	Oil shale, medium: dark brown to rare tan and dark brownish-gray (10YR 3/3-5/3, rare 6/3 and 3/2-2/2), calcareous. Moderately distinct to very faint, slightly irregular and distorted laminations; some small loop structures. Slightly irregular medium to thick shaly parting; fairly smooth to conchoidal fracture. Some thin to fine, tan to buff stringers, streaks, and lenses.
585.2	587.9	Oil shale, medium: dark brownish-gray to brownish-black and rare dark to medium brown (10YR 2/2-1/2, rare 3/2 and 3/3-4/3), very rare resinous luster, calcareous to some dolomitic. Very faint fairly smooth to some irregular distorted laminations. Regular to rare irregular thick shaly parting; very conchoidal fracture. Very common thin to thick (up to 1-1/2-inch) irregular dark to medium brownish-gray, granular to silty, bitumen-impregnated tuff stringers in very distorted shale from 587.2 to 587.9 feet. Sample of thick granular tuff with some fine oil-shale stringers from 587.7 feet: X-ray - analcite, quartz; some feldspar, calcite, dolomite.
587.9	591.8	Oil shale, medium to lean: dark and rare medium brownish-gray to some brownish-black (10YR 2/2-3/2, some 1/2, rare 4/2), very calcareous. Very faint slightly irregular and distorted to some smooth laminations. Regular to slightly irregular, thick to some medium shaly parting; fairly smooth to very conchoidal fracture. Rare thin irregular dark brown to brownish-gray, granular to dense tuff stringers.
591.8	593.3	Oil shale, lean: dark to rare medium brownish-gray and brown, very rare brownish-black (10YR 3/2 and 3/3-2/2, rare 4/3-5/3 and 1/2), calcareous. Very faint and rare moderately distinct, irregular and distorted to smooth laminations. Regular to some irregular thick shaly parting; very conchoidal fracture. Some very thin granular impregnated tuff stringers in upper part. A thin irregular buff earthy stringer at 592.3 feet. Sample of thin buff earthy stringer from 592.3 feet: X-ray - quartz, analcite; some feldspar, dolomite.

Illustration No. SBR-3846P (Sheet 25 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
593.3	596.7	Oil shale, lean: dark to rare medium brownish-gray and brownish-black (10YR 2/2, some 3/2, rare 4/2 and 1/2), very calcareous. <u>Very</u> faint to rare faint, slightly irregular and distorted to smooth laminations. Regular to some irregular thick shaly parting; slightly conchoidal to very conchoidal fracture. Some thin to fine dense brownish-gray dolomite (?) streaks and lenses at 594.5 feet. A very thin irregular buff-white earthy to chalky stringer at 594.6 feet.
596.7	598.9	Oil shale, lean: medium to dark brownish-gray and brown (10YR 4/2 and 4/3-2/2, some 5/2), very calcareous. Faint and some moderately distinct, slightly irregular and distorted to fairly smooth laminations; some poorly-formed loop structures. Slightly irregular to some very irregular thick shaly parting; conchoidal fracture. Some very irregular thin to fine, tan to buff dolomite (?) stringers in upper part. A 0.2-foot irregular tan to dark brownish-gray, granular to dense, bitumen-impregnated tuff at 598.6 feet. Some vertical fractures with brown resinous coatings from 598.2 to 598.9 feet.
598.9	603.1	Oil shale, lean to medium: dark brownish-gray to rare dark brown and brownish-black (10YR 2/2-3/2, rare 3/3 and 1/2), very calcareous to rare slightly calcareous. Very faint slightly irregular and distorted to rare contorted laminations. Regular to irregular thick parting; very conchoidal fracture.
603.1	605.1	Oil shale, lean: dark to medium and rare light brownish-gray and brown (10YR 3/2 and 3/3-4/2 and 4/3, some 5/3 and rare 6/3 in upper part), calcareous to very calcareous. Moderately distinct to very faint, irregular and slightly distorted laminations and rare streaked bedding. Slightly irregular thick shaly parting; slightly irregular to conchoidal fracture. Thin dark brown bitumen-impregnated granular tuff stringers at 603.2 and 603.5 feet; a 3/4- to 1-1/4-inch, silty to granular impregnated tuff at 603.6 feet. Rare fine buff to brownish-gray crystalline stringers and lenses in lower half.
605.1	607.1	Oil shale, medium: dark brownish-gray and brown to brownish-black (10YR 3/2 and 3/3-1/2), calcareous, to some dolomitic. Faint to very faint, irregular and slightly distorted to some smooth laminations. Slightly irregular thick shaly parting; conchoidal and rare very slight hackly fracture.

Illustration No. SBR-3846P (Sheet 26 of 49)

Laramie Petroleum Research Center, Laramie, Wyoming

August 17, 1964

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
607.1	610.0	Oil shale, medium to lean: dark brownish-gray to dark and rare medium brown (10YR 2/2-3/2 and 3/3, rare 4/3), slightly calcareous to very calcareous. Very faint to faint, slightly irregular and distorted to some smooth laminations. Slightly irregular thick shaly parting; conchoidal fracture. An irregular 1-inch tan to brown earthy to granular tuff at 607.3 feet.
610.0	611.0	Oil shale, lean: dark to medium brown and brownish-gray, some tan to rare buff in upper 0.3 foot (10YR 3/3 and 3/2-4/3, some 5/3-6/3, rare 7/2 and 2/2), very calcareous. Moderately distinct to very faint, irregular, distorted and rare displaced to fairly smooth laminations; rare loop structures. Slightly irregular to some very irregular thick parting; conchoidal to irregular fracture. A 3/4-inch irregular light to dark brownish-gray, strongly impregnated tuff at 610.1 feet.
611.0	612.4	Oil shale and rare marlstone: brown to tan and buff, some dark brown in upper and lower parts and very light buff in middle (10YR 4/3-6/3 and 7/2, some 3/3 and 8/2), very calcareous. Very distinct to some very faint, irregular, distorted and displaced to some fairly smooth laminations; some loop structures. Slightly irregular thick shaly parting; conchoidal to slightly irregular fracture. A very irregular thin to fine buff earthy stringer with some very small flat vugs partly filled with dark brown earthy material at 612.0 feet. A fine vitreous black striated crust on parting surface near base.
612.4	617.6	Oil shale, medium to lean: dark brownish-gray and brown, some brownish-black in upper half (10YR 2/2-3/2 and 3/3, some 1/2), very calcareous to rare slightly calcareous. Faint to very faint, irregular and distorted to smooth laminations. Regular to some irregular thick shaly parting; conchoidal to rare very slight hackly fracture.
617.6	620.0	Oil shale, lean: dark to some medium brownish-gray and brown (10YR 3/2 and 3/3-2/2, some 4/2, rare 5/2), very calcareous. Faint and some very faint, smooth to slightly irregular and distorted laminations. Regular to very irregular thick parting; slightly conchoidal to very conchoidal and some irregular fracture. A thin distorted gray-buff earthy band with a fine black slightly stylolitic seam at 619.6 feet. Sample of thin earthy band with fine black seam from 619.6 feet. X-ray - quartz; some analcite, dolomite, calcite.

Illustration No. SBR-3846P (Sheet 27 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
620.0	622.0	Oil shale, medium: dark brownish-gray and some dark brown to brownish-black (10YR 3/2-1/2, some 3/3), very rare resinous luster in lower part, very calcareous to calcareous. Very faint to faint, smooth to some irregular and slightly distorted laminations and some very faint streaked bedding. Regular to some irregular thick shaly parting; slightly conchoidal to some very irregular fracture.
Upper wavy bed		
622.0	624.6	Tuff: brown to light tan (10YR 5/3-7/3), calcareous, granular to silty. Very common thick to fine conchoidal oil-shale stringers, streaks and shreds; a very thick oil-shale stringer with some thin tuff stringers at 622.4-622.8 feet. Very irregular parting and fracture. Common brown to black bitumen impregnations in granular parts.
624.6	628.8	Oil shale, lean: dark to rare medium brownish-gray and brownish-black (10YR 3/2-2/2, rare 4/2-5/3 and 1/2), very calcareous. Very faint to faint, irregular, distorted laminations. Slightly irregular to rare very irregular thick shaly parting; very conchoidal to some fairly smooth fracture. Rare fine tan earthy laminae, streaks, and lenses in middle part. Some irregular buff bleached streaks extending in from side of core in lower 0.3 foot.
628.8	632.0	Oil shale, partly bleached: dark brownish-gray and brown (10YR 2/2-3/2 and 3/3), bleached to tan and buff (10YR 5/3-6/3). Very faint slightly irregular and distorted laminations. Slightly irregular thick shaly parting; very irregular to conchoidal fracture. A smooth vertical fracture with buff-yellow (10YR 6/4) earthy coatings runs through the interval; irregular bleached zones with some shrinkage cracks extend laterally up to 1/2-inch. Uneven sample split. Sample of unaltered shale from 631.6 feet: X-ray - calcite, dolomite, quartz, analcite, feldspar. Sample of bleached shale from 631.6 feet: X-ray - calcite, quartz, mixed layer clay (montmorillonite-illite), feldspar, dolomite.

Illustration No. SBR-3846P (Sheet 28 of 49)

Laramie Petroleum Research Center, Laramie, Wyoming

August 17, 1964

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
632.0	637.0	Oil shale, medium and some rich: dark brownish-gray and brown to some brownish-black (10YR 3/2 and 3/3-2/2, some 1/2), calcareous and rare dolomitic. Very faint to faint, irregular distorted laminations; some loop structures in upper part. Slightly irregular thick shaly parting; very conchoidal fracture.
637.0	640.0	Oil shale, lean: dark to rare medium brownish-gray and brown (10YR 3/2-3/3, some 2/2, rare 4/2-5/2), calcareous to very calcareous. Very faint to faint, slightly irregular and distorted laminations. Slightly irregular to irregular, thick to medium parting; conchoidal fracture. An irregular 1/4- to 3/4-inch, gray to yellowish-gray finely speckled band at 638.7 feet with common <u>very</u> small cavities in lower part. Sample of thin yellowish-gray band from 638.7 feet: X-ray - analcite, quartz, feldspar; some calcite, dolomite.
640.0	641.4	Oil shale, lean: dark to medium brown and brownish-gray (10YR 3/3 and 3/2-4/2, some 2/2), calcareous. Faint slightly irregular and distorted to fairly smooth laminations; some very small loop structures and displacements in lower part. Irregular medium to thick parting; conchoidal fracture. Very rare fine irregular brownish-gray crystalline stringers and lenses.
641.4	645.1	Oil shale, medium: dark brownish-gray and brown to rare brownish-black (10YR 2/2-3/2 and 3/3, rare 1/2), very calcareous. Very faint smooth to some slightly irregular and distorted laminations and some <u>very</u> faint bedding. Slightly irregular to irregular, thick to medium parting; very conchoidal and some irregular fracture. Some fine dark to light gray (slightly blue) crystalline stringers and lenses at 641.9 feet. Sample of shale with gray lenses and stringers from 641.9 feet: X-ray - fluorite, halloysite, feldspar, quartz, dolomite, analcite.
645.1	646.1	Oil shale, lean: dark brownish-gray and brown to tan and rare buff (10YR 3/2 and 3/3-6/2 and 6/3, some 2/2, rare 7/2), calcareous. Distinct slightly irregular and distorted laminations; common small loop structures. Irregular to regular, thick to medium shaly parting; very conchoidal fracture. A vertical fracture with dark brown varnish-like coatings and small white chalky spots runs from 645.0 to 645.6 feet.

Illustration No. SBR-3846P (Sheet 29 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
646.1	647.2	Oil shale, lean: dark to some medium brown and brownish-gray (10YR 3/3 and 3/2-2/2, some 4/3), calcareous. Faint to moderately distinct, slightly irregular and distorted to smooth laminations; some small loop structures. Slightly irregular thick shaly parting; very conchoidal fracture. A very thin irregular gray stringer at 646.5 feet (like 641.9 feet?).
647.2	648.6	Oil shale, lean: dark brown and brownish-gray to tan and buff (10YR 3/3 and 3/2-6/3 and 7/2 rare 2/2), calcareous to very calcareous. Very distinct slightly irregular, distorted and displaced laminations; very common loop structures. Regular to slightly irregular thick shaly parting; very conchoidal fracture.
648.6	651.7	Oil shale, medium: dark brown and brownish-gray to brownish-black (10YR 3/3 and 3/2-1/2), calcareous. Very faint to faint, smooth to slightly irregular and distorted laminations, rare very faint loop structures. Slightly irregular to irregular thick parting; conchoidal to some fairly smooth fracture. Very rare vitreous black striated crusts on parting surfaces.
651.7	654.3	Oil shale, lean: dark brownish-gray and brown to tan and buff (10YR 2/2 and 3/3-6/3 and 7/2), very calcareous. <u>Very</u> distinct irregular, distorted and some displaced laminations; very common small to fairly large loop structures. Slightly irregular to regular thick shaly parting; very conchoidal fracture. Very rare fine pyrite streaks.
654.3	656.0	Oil shale, rich: dark brownish-gray to brownish-black and rare dark brown (10YR 2/2-1/2, rare 3/2-3/3), common satiny to resinous luster, slightly calcareous to dolomitic. Faint to very faint, slightly irregular and distorted to smooth laminations. Slightly irregular to regular thick shaly parting; slightly conchoidal fracture. Slight bleaching on edge of core at 654.8-655.0 feet.
656.0	660.3	Oil shale, medium and lean: dark brown and brownish-gray to rare brownish-black, some medium brown--especially at 656.0-656.2, 657.4-657.7, and 658.3-658.7 feet (10YR 3/3 and 3/2-2/2, some 4/3, rare 5/3 and 1/2), slightly calcareous to very calcareous. Faint irregular and distorted to some smooth laminations; some small poorly-formed loop structures--especially in lower part. Slightly irregular to some irregular thick shaly parting; conchoidal fracture.

Illustration No. SBR-3846P (Sheet 30 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
660.3	661.1	Oil shale, lean: dark to some medium brown and brownish-gray (10YR 3/3-3/2, some 2/2 and 4/3-5/3), very calcareous. Faint to some moderately distinct, slightly irregular, distorted and displaced laminations. Slightly irregular to irregular thick parting; conchoidal fracture.
661.1	662.1	Oil shale, medium: dark to rare medium brownish-gray and brown (10YR 3/2 and 3/3-2/2, rare 4/3), very calcareous. Faint to moderately distinct, slightly irregular and distorted to some smooth laminations; some loop structures. Irregular to slightly irregular thick parting; conchoidal fracture. Very rare very fine dark brownish-gray crystalline streaks.
662.1	663.1	Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2), common satiny to resinous luster, slightly calcareous to dolomitic. Faint to very faint, irregular and distorted to smooth laminations. Slightly irregular thick shaly parting; conchoidal and some irregular fracture. Very rare fine dark brownish-gray to brownish-black stringers and lenses. Sample of dark brownish-gray oil shale with fine bitumen-impregnated crystalline stringer from 662.4 feet: X-ray - dolomite, analcite, quartz, feldspar, illite.
663.1	664.4	Oil shale, medium: dark brownish-gray and brown (10YR 2/2-3/2 and 3/3), very calcareous. Faint and some moderately distinct, smooth to slightly irregular and distorted laminations; some loop structures. Slightly irregular to regular thick shaly parting; slightly conchoidal to smooth fracture. A very irregular fine earthy buff stringer near top.
664.4	665.4	Oil shale, medium to lean: dark brownish-gray and brown to some tan and buff (10YR 2/2-5/3, some 6/3-7/2), calcareous. Faint to distinct, smooth to some irregular, distorted and displaced laminations; some small to moderately large loop structures. Slightly irregular to very regular thick shaly parting; smooth to slightly conchoidal and rare irregular fracture.
665.4	666.4	Oil shale, rich: dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2), common resinous and some waxy luster, slightly calcareous to dolomitic, tuffaceous (?). Distinct to faint, smooth to irregular

Illustration No. SBR-3846P (Sheet 31 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		distorted laminations; rare large loop structures and displacements. Very regular thick to medium shaly parting; slightly conchoidal to very slight hackly fracture. Middle part consists of very fine dark brownish-gray silty to granular tuff (?) laminae and fine brownish-black resinous laminae. A thin displaced light gray silty stringer at 665.7 feet. Some very fine pyrite streaks and blebs in middle part. Sample of thin gray silty stringer from 665.7 feet: X-ray - ferroan, feldspar. Sample of rich tuffaceous (?) shale from 665.9 feet: X-ray - dolomite; some quartz, feldspar.
666.4	667.3	Oil shale, medium: dark to medium brownish-gray and brown (10YR 2/2-5/2 and 5/3), very calcareous. Faint to moderately distinct, smooth to slightly irregular, distorted and displaced laminations; some small loop structures. Very regular to slightly irregular thick shaly parting; smooth to conchoidal fracture.
Top A-groove 667.3	670.5	Oil shale, very lean: medium and some dark brown to tan and buff (10YR 4/3-6/3 and 7/2, some 3/3-2/2, rare 8/2), very calcareous. Very distinct slightly irregular, distorted and displaced to smooth laminations and rare faintly bedded bands; very common loop structures. Very regular to some slightly irregular, thick to medium shaly parting; conchoidal fracture. Some very fine smooth vertical calcite filled fractures in upper foot. Some fine massive pyrite streaks at 667.7 and 668.4 feet. Some small chalky white spots and irregular vugs at 669.9 feet.
670.5	671.8	Oil shale, lean: dark brown and brownish-gray to tan and buff, very rare brownish-black (10YR and 7.5YR 2/2 and 3/3-6/3 and 7/2, rare 1/2), very calcareous. <u>Very</u> distinct and some faint, slightly irregular and distorted to some slightly contorted laminations; some small loop structures and displacements. Regular to irregular, thick to medium parting; conchoidal to irregular fracture. Some very fine disseminated crystals at 670.9-671.0 feet; a very irregular thin granular tuff stringer at 671.0 feet. Slightly contorted shale with silty to chalky, buff to white tuff (?) in lower 0.1 foot (partly broken up).

Illustration No. SBR-3846P (Sheet 32 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of buff tuff with fine vitreous black organic specks from 671.7 feet: X-ray - dolomite; some quartz, feldspar.
671.8	672.9	Oil shale, lean to very lean: dark brown and brownish-gray to buff (10YR and 7.5YR 3/3 and 3/2-7/2, rare 2/2), very calcareous to slightly calcareous. Very faint to distinct, smooth to slightly irregular and distorted laminations; intricately folded and displaced in lower inch. Irregular to very regular thick parting; irregular to conchoidal fracture. Some fine massive pyrite streaks at 672.7 feet. Common very small loop structures in lower half.
672.9	676.7	Oil shale and marlstone: light brownish-gray to very light gray-buff and some tan to rare dark brownish-gray (10YR 6/2-8/1, some 6/3-5/3, rare 4/2-3/2), very calcareous to slightly calcareous. Distinct to some very faint, slightly irregular, distorted and displaced to very smooth laminations; very common loop structures. Very regular thick to medium and rare thin shaly parting; conchoidal fracture. Rare very fine dark gray to black very pyritic laminae, streaks, and blebs.
Bottom A-groove 676.7	678.3	Oil shale, lean to medium: dark to medium and rare light brownish-gray (10YR 3/2-4/2, rare 2/2, some 5/2-6/2 in upper part). Moderately distinct to very faint, smooth to rare very irregular and distorted laminations; some small loop structures and displacements in upper part. Very regular to some irregular thick shaly parting; conchoidal to slightly irregular and very rare hackly fracture. Some small buff earthy lenses in distorted shale at 677.0-677.2 feet. Some thin irregular dense brown to gray dolomite stringers in middle part. Sample of dense dolomite stringer from 677.5 feet: X-ray - dolomite.
678.3	679.3	Oil shale, medium: dark to rare medium brownish-gray (10YR 3/2-2/2, rare 4/2), dolomitic. Very faint smooth to irregular distorted laminations and some very faint streaked bedding. Irregular to slightly irregular thick parting; irregular and rare hackly fracture.
679.3	680.1	Oil shale, very rich: dark and rare medium brownish-gray and brown to brownish-black (10YR 3/2 and 3/3-1/2, rare 4/3), very common resinous to waxy luster, dolomitic to calcareous. Moderately distinct, very irregular and

Illustration No. SBR-3846P (Sheet 33 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		distorted to fairly smooth laminations; some loop structures and displacements. Slightly irregular curved to flat shaly parting; conchoidal and some slight hackly fracture. Some medium-size lenses and fine stringers of brown to tan, dense to granular tuff in distorted shale near top.
680.1	683.3	Oil shale, medium: dark brown and brownish-gray to tan and buff (10YR 3/2 and 3/3-6/3 and 7/2, rare 2/2), very calcareous to slightly calcareous. Moderately distinct to very distinct, very irregular, distorted and displaced laminations; some irregular loop structures. Slightly irregular to some very regular, thick to medium shaly parting; slightly conchoidal to irregular and rare hackly fracture. Some buff to dark brownish-gray and dark gray crystalline lenses and stringers--some with fine disseminated pyrite. Some medium to thin brownish-gray to buff silty tuffs in lower part. A short vertical fracture with some fine pyrite crystals at 683.0 feet.
683.3	684.3	Oil shale, medium: dark and some medium brownish-gray to brownish-black (10YR 3/2-1/2, some 4/2-5/2), dolomitic. Moderately distinct to faint, very irregular and distorted to fairly smooth laminations. Irregular to rare regular thick parting; very hackly to conchoidal fracture. Some thin to fine, dense to silty brownish-gray stringers in upper part. A 1-1/2-inch light gray to light brownish-gray fine granular tuff at 683.8 feet with smooth top and wavy base; a thin tuff stringer at 684.1 feet. Sample of granular tuff with some fine bitumen specks from 683.8 feet: X-ray - analcite, quartz, some feldspar.
684.3	684.8	Tuff: brownish-gray to buff (10YR 5/3-7/2), silty to earthy. Faintly speckled; rare fine contorted oil-shale stringers. Some fine bitumen specks and fracture fillings. Sharp slightly irregular contacts at top and bottom.
684.8	685.5	Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2), dolomitic. Faint smooth to irregular distorted laminations; some poorly-formed loop structures. Regular to irregular, thick to thin parting; slightly conchoidal and some very slight hackly fracture. Rare thin to fine buff tuff stringers. Common thin dark gray to dark brownish-gray, silty textured crystalline stringers at 685.1 feet.

Illustration No. SBR-3846P (Sheet 34 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
685.5	687.3	Oil shale, medium: dark brown and brownish-gray to some brownish-black and rare tan (10YR 3/4 and 3/2-2/2, some 1/2 and 4/3-4/2, rare 5/3-6/3), very calcareous. Moderately distinct slightly irregular and distorted to some smooth laminations; some small to moderately large loop structures and displacements. Regular to rare irregular thick shaly parting; slightly conchoidal fracture; lower part elastic and tough. A thin irregular yellowish-gray silty tuff stringer at top. Common small medium to dark brown, granular to slightly spongy, bitumen-impregnated lenses at 685.8 feet. Some small brown to tan, silty to dense crystalline lenses at 686.6-686.7 feet. Sample of small brown to tan crystalline lens from 686.7 feet: X-ray - feldspar, analcite, fluorite, quartz.
687.3	688.8	Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), some resinous luster in lower part, dolomitic. Faint to <u>very</u> faint, smooth to irregular distorted laminations. Slightly irregular thick shaly parting; slightly conchoidal to very slightly hackly fracture; elastic and tough. Rare very fine dark brownish-gray pyritic crystalline stringers. Three very irregular, medium to thin, granular to silty impregnated tuff lenses (pinched out bands) at 688.3 to 688.5 feet.
688.8	690.8	Oil shale, rich to medium: dark brown to brownish-black (10YR 3/3-1/2 in upper part; 3/4-3/2, rare 2/2-1/2 in lower part), slightly calcareous. Faint to very faint, smooth to slightly irregular and distorted laminations. Regular to slightly irregular thick shaly parting; slightly conchoidal to smooth fracture; upper part elastic and tough. Thin dense brown crystalline stringers at 689.1 and 689.9 feet. Very rare very fine gray pyritic streaks in lower part.
690.8	692.8	Oil shale, medium to lean: dark to medium brownish-gray and brown (10YR 3/2 and 3/3-4/2 and 4/3, some 2/2 in upper part and some 5/2-5/3 in lower part), calcareous. Faint smooth to some slightly irregular and distorted laminations. Regular to irregular thick parting; slightly irregular to conchoidal fracture. Rare fine gray pyritic streaks in upper part. Some brown to black varnish-like coatings and fine yellowish-buff spots on parting surfaces at 691.7 feet.

Illustration No. SBR-3846P (Sheet 35 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
692.8	695.0	Oil shale, medium: dark brownish-gray and brown to some tan and rare brownish-black (10YR 3/2 and 3/3-2/2, rare 1/2 in upper part and some 4/3-5/3 in lower part), slightly calcareous to calcareous. Faint to rare distinct, slightly irregular and distorted to some smooth laminations. Slightly irregular thick shaly parting; slightly irregular to conchoidal fracture.
695.0	695.8	Oil shale, medium to lean: dark to medium brownish-gray and brown (10YR 3/2 and 3/3-5/2 and 5/3, some 2/2 in upper part), calcareous. Very faint to moderately distinct, slightly irregular and distorted to smooth laminations; rare loop structures. Irregular to slightly irregular thick parting; conchoidal and some irregular fracture. A 1/2-inch very dense dark brown dolomite band at 695.4 feet. Some very fine gray pyritic laminae and rare small lenses in lower part.
Mahogany marker		
695.8	696.3	Tuff: light to medium gray (6.5-5N; some slight brown tint), granular to silty. Mottled and speckled to massive. Very irregular fracture. Common contorted lean oil-shale stringers and some very pale pyrite blotches in upper 0.1 foot. Some fine bitumen spots in middle part. Common <u>very</u> fine disseminated bright yellow pyrite crystals in lower part. Interfingering contact at top; sharp wavy contact at base.
696.3	699.3	Oil shale, lean: dark brownish-gray and brown to tan and buff (10YR 3/2-6/2, some 2/2 and 6/3, rare 3/1 and 7/2 in upper part; 10YR 2/2 and 3/3-6/3 and 7/2 in middle and lower parts), slightly calcareous to some very calcareous. Moderately distinct to very distinct, irregular, distorted and displaced to some very smooth laminations; common loop structures. Very regular to rare irregular thick shaly parting; slightly conchoidal fracture. Some to rare fine gray pyritic laminae and streaks. A very lean tan and buff zone at 697.6-697.9 feet. A very irregular 1/2- to 3/4-inch, dark gray to brownish-gray crystalline tuff with common <u>small drusy</u> cavities at 699.2 feet.
699.3	700.6	Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2), common resinous to waxy luster, dolomitic. Faint to <u>very</u> faint, smooth to irregular and slightly distorted laminations. Very regular to slightly irregular, thick to medium shaly parting; conchoidal and some very slight hackly fracture. Tuffaceous (?) from 699.6 to 699.9 feet (like 665.9 feet).

Illustration No. SBR-3846P (Sheet 36 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
700.6	702.6	Oil shale, medium: dark brownish-gray and rare brownish-black to dark and rare medium brown (10YR 2/2-3/2, rare 1/2 in upper part; 2/2-3/3, rare 4/3-5/3 in lower part), slightly calcareous to calcareous. Very faint to moderately distinct, slightly irregular and distorted to some very irregular, distorted and displaced laminations. Slightly irregular to irregular thick parting; conchoidal to fairly smooth fracture. A fine irregular earthy buff stringer at 701.2 feet. Some small faintly bedded (?) tan earthy lenses in very distorted shale at 702.2 feet.
702.6	703.8	Oil shale, medium: dark brownish-gray and some dark brown to rare brownish-black (10YR 2/2-3/2, some 3/3, rare 1/2), slightly calcareous to dolomitic. Very faint fairly smooth fine streaks and stringers to faint smooth laminations. Slightly irregular to irregular thick parting; hackly to conchoidal fracture. A 1/2-inch dense dark brown dolomite band with some small earthy to crystalline lenses at 703.2 feet. A very irregular 1- to 2-inch, tan to buff, earthy to silty crystalline tuff at base with some contorted oil-shale stringers and bitumen impregnations.
703.8	704.8	Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), some resinous luster, dolomitic. Very faint smooth laminations. Slightly irregular to very regular, thick to medium shaly parting; slight hackly to smooth fracture; elastic and tough. Rare small dark gray pyritic lenses. An irregular very dark brown silty stringer with rare pyrite at 704.7 feet.
704.8	705.8	Oil shale, rich: dark brownish-gray and brown to rare brownish-black (10YR 2/2-3/2, and 3/3, rare 1/2), rare resinous luster, dolomitic to slightly calcareous. Very faint to faint smooth laminations. Regular thick shaly parting; slightly conchoidal to smooth and rare slight hackly fracture. Very rare <u>very</u> fine dark brownish-gray pyritic streaks.
705.8	707.1	Oil shale, <u>very</u> rich: dark brownish-gray and rare brownish-black (10YR 2/2-3/2, rare 1/2), very common resinous and some waxy luster in upper half, dolomitic. Very faint fairly smooth to some irregular, distorted and displaced laminations. Very regular to slightly irregular thick shaly parting; conchoidal and some slight hackly fracture; elastic and tough (very irregular sharp hackly fracture due to fine irregular natural fractures in shale at 706.4-706.5 feet).

Illustration No. SBR-3846P (Sheet 37 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
707.1	709.1	Oil shale, <u>very</u> rich: brownish-black to dark brownish-gray, some tan to buff in upper part (10YR 1/2-3/2, some 4/3-6/3; common slight olive tint in lower part), very common waxy and resinous luster, dolomitic. Faint and some very distinct, very irregular and distorted laminations; very common large loop structures. Very regular thick shaly parting; hackly to conchoidal fracture; elastic and tough.
709.1	712.2	Oil shale, very rich: dark brownish-gray to brownish-black and some dark brown (10YR 2/2-1/2, common 3/4-3/2 at 710.2-710.6 feet), common slight resinous luster, dolomitic to slightly calcareous. Faint to <u>very</u> faint, smooth to some irregular and slightly distorted laminations. Regular to slightly irregular, thick to medium shaly parting; conchoidal fracture; elastic and tough. Rare very fine pyrite streaks in lower part. A fine vitreous black organic lamina at 711.5 feet.
712.2	714.7	Oil shale, medium: dark brownish-gray and brown to some tan and buff (10YR 2/2-3/2 and 3/3, some 4/3-6/3 in middle part), calcareous to very calcareous. Faint to distinct, smooth to some irregular, distorted and displaced laminations; some loop structures in middle part. Regular to rare irregular thick shaly parting; conchoidal fracture. Very rare fine pyrite streaks in upper part.
714.7	716.2	Oil shale, very rich: dark brownish-gray to brownish-black and some dark brown (10YR 2/2-1/2; some 3/2-3/3), some resinous luster in lower part, dolomitic to slightly calcareous. Very faint smooth streaked bedding in upper 0.3 foot; faint irregular and distorted streaks, stringers, and laminations from 715.0 to 715.3 feet; very faint fairly smooth laminations in lower part. Regular to slightly irregular thick shaly parting; smooth to conchoidal fracture. Very rare very fine pyrite streaks in lower part.
716.2	718.2	Oil shale, medium: dark brownish-gray and brown to some tan (10YR 2/2-4/3, some 5/3 and rare 6/3 in lower part), very calcareous. Faint to fairly distinct, smooth to slightly irregular, distorted and displaced laminations; common loop structures. Regular to rare irregular, thick to medium shaly parting; conchoidal and some irregular fracture.

Illustration No. SBR-3846P (Sheet 38 of 49)

Laramie Petroleum Research Center, Laramie, Wyoming

August 17, 1964

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
718.2	719.9	Oil shale, medium: dark to rare medium brown and brownish-black (10YR 3/4-3/2, some 2/2, rare 1/2 and 4/3), very calcareous. Very faint to moderately distinct, slightly irregular and distorted to smooth laminations; rare very faint streaked bedding; some loop structures. Regular to some irregular thick shaly parting; conchoidal fracture; some elastic and tough.
719.9	720.9	Oil shale, <u>very</u> rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2), common satiny to resinous luster, dolomitic. <u>Very</u> faint smooth streaked bedding and some laminations. Regular to slightly irregular thick shaly parting; slightly conchoidal and some slight hackly fracture; elastic and tough. Very rare very fine pyrite streaks.
720.9	722.7	Oil shale, very rich: dark brownish-gray and some dark brown to rare brownish-black (10YR 3/2-2/2, some 3/3, rare 1/2), slightly calcareous. Very faint to faint, slightly irregular and distorted to smooth laminations. Very regular to slightly irregular thick shaly parting; slightly conchoidal to smooth fracture; elastic and tough. A 0.1 foot very rich resinous band near top; some thin to fine resinous bands in other parts. A 1/2- to 3/4-inch brown silty stringer at 721.7 feet.
722.7	723.7	Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, some 3/2), common satiny to resinous luster, dolomitic. Very faint to faint, smooth to some slightly irregular and distorted laminations. Regular to some irregular thick shaly parting; slightly conchoidal fracture; elastic and tough. A thin irregular brown to tan, dense to silty tuff stringer with some pyrite blebs at 722.9 feet. Rare very fine vitreous black organic streaks.
723.7	726.7	Oil shale, medium to rich: dark to some medium brown and brownish-gray, some brownish black in lower part (10YR 3/3 and 3/2-2/2, some 3/4-4/3 and 1/2), some resinous luster in lower part, slightly calcareous to calcareous. Moderately distinct to some very faint, slightly irregular, distorted and some displaced to fairly smooth laminations. Very regular to some irregular thick shaly parting; fairly smooth to some very conchoidal fracture; some elastic and tough. Some small tan earthy tuff lenses with pyrite at 724.0 feet. Rare very fine pyrite laminae and streaks in upper half. Thin irregular dense to silty, dark brown to tan tuff stringers at 725.7 and 726.6 feet.

Illustration No. SBR-3846P (Sheet 39 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
726.7	729.2	Oil shale, medium: dark to medium brownish-gray and brown, rare buff and brownish-black (10YR 3/2 and 3/3-4/2 and 4/3, some 2/2 and 5/2-5/3, rare 6/3-7/2 and 1/2), calcareous to slightly calcareous. Faint to some fairly distinct, smooth to some very irregular, distorted and displaced laminations. Slightly irregular to regular, thick to medium shaly parting; smooth to slightly conchoidal and rare irregular fracture. Rare small very light buff earthy lenses and fine streaks in middle part. Some medium to fine very rich resinous bands in lower part.
729.2	730.2	Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2), common resinous and rare waxy luster, dolomitic to slightly calcareous. Faint to very faint, irregular, distorted and displaced to slightly contorted laminations; rare loop structures. Regular to some irregular thick shaly parting; conchoidal and some hackly fracture. Some very large irregular lenses and thin stringers of yellowish-tan to buff earthy to dense crystalline tuff with some disseminated and massive pyrite. Sample of large tuff lens from 729.8 feet: X-ray - feldspar, quartz, analcite, pyrite
730.2	731.9	Oil shale, medium: dark brownish-gray and brown to tan and rare buff (10YR 3/2 and 3/3-5/3, some 6/3, rare 7/2), calcareous. Faint to distinct, smooth to irregular and slightly distorted laminations; some small poorly formed loop structures. Regular to slightly irregular, thick to medium shaly parting; fairly smooth to conchoidal fracture. Rare fine gray pyritic streaks. Rare very thin irregular buff to light gray, earthy to silty stringers.
731.9	735.4	Oil shale, rich and some medium: dark brownish-gray, some dark brown to tan from 732.6 to 733.4 feet (10YR 2/2-3/2, some 3/3-5/3), rare very fine resinous streaks, slightly calcareous. Very faint smooth streaked bedding; moderately distinct slightly irregular, distorted and displaced laminations from 732.6 to 733.4 feet. Regular to rare irregular thick shaly parting; smooth to slightly conchoidal fracture; elastic and tough. Rare very fine pyrite streaks. Very rare very small dense brownish-gray crystalline lenses.

Illustration No. SBR-3846P (Sheet 40 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
735.4	736.4	Oil shale, rich: dark brownish-gray and brown (10YR 3/2 and 3/3-2/2), calcareous. Very faint smooth streaked bedding to faint smooth laminations. Slightly irregular to regular thick shaly parting; smooth fracture; elastic and tough. Very rare very small pyrite blebs.
736.4	738.4	Oil shale, medium: dark to some medium brown and brownish-gray, rare brownish-black (10YR 3/3-2/2, some 4/3, rare 1/2), rare slight resinous luster, very calcareous. Faint to some moderately distinct, fairly smooth to irregular distorted laminations; some small to moderately large loop structures. Regular to slightly irregular, thick to medium shaly parting; smooth to conchoidal fracture; slightly elastic and tough. Very rare very thin dense dark brownish-gray crystalline stringers and lenses--some with pyrite.
738.4	740.4	Oil shale, very rich to rich: dark brownish-gray to brownish-black, some dark brown in lower part (10YR 2/2-1/2, some 3/2-3/4), common satiny to resinous luster, dolomitic to some calcareous. Very faint slightly distorted to smooth streaked bedding; some faint slightly irregular distorted and displaced laminations in lower part. Regular to slightly irregular, thick to rare thin shaly parting; slightly conchoidal to rare slight hackly fracture; elastic and tough. Very rare very fine pyrite streaks and blebs.
740.4	741.5	Oil shale, medium: dark to medium brownish-gray and brown, rare brownish-black (10YR 3/2 and 3/3-4/3, some 2/2, rare 5/3 and 1/2), very rare slight resinous luster, calcareous. Faint to moderately distinct, slightly irregular and distorted laminations; some to common loop structures. Slightly irregular thick to medium shaly parting; slightly conchoidal to fairly smooth fracture. Very rare fine dark gray silty laminae.
741.5	744.7	Oil shale, medium: dark and some medium brownish-gray and brown (10YR 3/2-3/3, some 4/3-5/3, rare 2/2), calcareous to very calcareous. Faint to very faint, slightly irregular and distorted to some fairly smooth laminations; rare small poorly formed loop structures. Regular to some irregular thick shaly parting; conchoidal to some very irregular fracture.

Illustration No. SBR-3846P (Sheet 41 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
744.7	745.7	Oil shale, medium: dark brownish-gray to brownish-black (10YR 3/2-1/2), some resinous luster, calcareous to slightly calcareous. Moderately distinct to some very faint, smooth to some irregular distorted laminations; rare poorly formed loop structures and displacements. Regular to some irregular thick shaly parting; conchoidal to irregular fracture. A very irregular thick dark brownish-gray to dark gray silty crystalline stringer with common pyrite and biotite at 745.3 feet. Sample of thick silty stringer with pyrite and biotite from 745.5 feet: K-ray - analcite, feldspar, quartz, pyrite, marcasite, biotite.
745.7	746.7	Oil shale, lean: dark brown and some dark brownish-gray to rare tan and buff (10YR 3/3-3/4; some 3/2-2/2 in upper part, rare 4/3-7/2 in lower part), calcareous to very calcareous. Very faint to rare very distinct, slightly irregular and distorted to smooth laminations. Slightly irregular to very regular thick shaly parting; conchoidal and some very irregular fracture. A thin irregular dense brown stringer with some pyrite near top. Some fine pyrite streaks--especially in lower part.
746.7	748.3	Oil shale, lean to very lean: dark brownish-gray and brown to very light buff (10YR 3/2 and 3/3-8/2), very calcareous. Very distinct smooth and rare very irregular and distorted laminations; some thick dark faintly laminated bands in upper part. Very regular thick shaly parting; smooth to conchoidal fracture. Some very fine tight smooth vertical fracture in upper part. Some thin to fine irregular light brown to gray, fine granular to silty porous stringers and lenses in dark bands in upper part.
748.3	749.8	Oil shale, lean to some rich: dark brownish-gray and brown to tan and some buff in upper half (10YR 3/2 and 3/3-5/3, some 6/3 and 2/2), medium brown to brownish-black in lower half (10YR 4/3-1/2); calcareous to some dolomitic. Distinct to faint, smooth to some slightly irregular and distorted laminations. Regular to slightly irregular thick shaly parting; conchoidal fracture; some slightly elastic and tough. Some tight irregular vertical fractures in upper part. A 3/4-inch smooth brown to tan finely mottled porous tuff band with rare pyrite at 749.1 feet.

Illustration No. SBR-3846P (Sheet 42 of 49)

Laramie Petroleum Research Center, Laramie, Wyoming

August 17, 1964

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
749.8	750.9	Oil shale, lean: medium to light olive-gray and some medium to dark brownish-gray (2.5Y 4/2-6/2 and 6/3, some 10YR 4/2-2/2), slightly calcareous. Faint and some very distinct, smooth to rare irregular and distorted laminations. Very regular to rare irregular thick shaly parting; conchoidal fracture. Rare thin to fine pyrite stringers in upper part. A 3-inch smooth brownish-gray to medium and light gray mottled, fine sandy to silty-textured band with some tight vertical fractures and rare pyrite at 750.3 feet. Sample of thick gray fine sandy-textured band from 750.4 feet: X-ray - feldspar (sanidine), analcite, quartz?, mixed layer. clay.
750.9	751.6	Oil shale, lean: medium to dark brownish-gray and brown (10YR 5/2 and 5/3-2/2), slightly calcareous. Faint to fairly distinct, smooth to some slightly irregular, distorted and displaced laminations; rare loop structures. Regular medium to thick shaly parting; very conchoidal fracture.
751.6	753.0	Oil shale, rich: dark brownish-gray and brown to brownish-black (10YR 3/2 and 3/3-1/2), common satiny to resinous luster, dolomitic to calcareous. Faint to very faint, slightly irregular and distorted to some smooth laminations. Regular to some irregular, thick to thin shaly parting; conchoidal and some very hackly fracture. A thin slightly irregular tan silty tuff band at top; a very thin slightly irregular gray to brown crystalline stringer at 751.9 feet.
753.0	755.0	Oil shale, medium to lean: dark brownish-gray to tan and some buff, rare brownish-black (10YR 2/2-5/2 and 5/3, some 6/3-7/2, rare 1/2), calcareous. Faint to very distinct, irregular and distorted to fairly smooth laminations; common small loop structures in upper part. Regular to some irregular thick shaly parting; conchoidal fracture. Some fine pyrite laminae and streaks and rare small gray pyritic lenses in upper part. Some fine tight vertical fractures in lower part. A thin dark brown silty tuff stringer with some pyrite at 754.9 feet.
755.0	755.8	Oil shale, medium: dark to medium brownish-gray and brown, rare brownish-black (10YR 2/2-4/3, rare 1/2 and 5/3), calcareous. Distinct to faint, irregular, distorted and displaced laminations; some small loop structures. Slightly irregular thick shaly parting; conchoidal fracture. Some satiny luster in lower part.

Illustration No. SBR-3846P (Sheet 43 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
755.8	757.0	Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2), common resinous and some waxy luster, dolomitic to calcareous. Very faint smooth to some irregular and distorted laminations. Regular to some irregular, thick to medium shaly parting; conchoidal fracture. Very rare thin to fine dark brownish-gray silty streaks and stringers.
757.0	758.0	Oil shale, lean: dark to medium brownish-gray and brown, rare buff (10YR 2/2-4/3, rare 5/3-6/3), calcareous to very calcareous. Faint slightly irregular and distorted to smooth laminations. Very regular to slightly irregular, thick to thin shaly parting; conchoidal fracture. Two very thin irregular buff-white to brownish-gray silty to earthy stringers in upper part. Rare irregular tight vertical fractures in lower part.
758.0	759.2	Marlstone and lean oil shale: buff to rare dark brown and brownish-gray (10YR 7/2-6/3, some 6/2-4/2 and 4/3, rare 3/2 and 3/3), very calcareous. Faint to some distinct, irregular and distorted to slightly contorted and displaced laminations. Slightly irregular to very irregular, thick to medium parting; very irregular to conchoidal fracture. Very common very irregular fine intersecting fractures with brown to black organic fillings. A wedge-shaped breccia mass (more than 1-inch thick at edge of core) at 758.3-758.4 feet with coarse platy to irregular marlstone fragments and bitumen-filled to rare open interspaces; laminae nearly horizontal above and inclined 30-45 degrees below--gradually decreasing to horizontal at 759.0 feet. A thin broken buff to white, earthy to chalky stringer with black bitumen specks and streaks at 758.6 feet. Sample of marlstone with thin earthy to chalky stringer from 758.6 feet: X-ray - analcite, quartz, dolomite, feldspar. Sample of fractured marlstone from 758.7 feet: X-ray - dolomite, quartz, some feldspar.
759.2	760.2	Oil shale, medium to rich: medium to dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2), rare resinous luster in lower part, very calcareous to calcareous. Faint to fairly distinct, smooth to irregular, distorted and displaced laminations. Irregular to some very regular, medium to thick parting; very conchoidal to irregular fracture. Some fine irregular vertical fractures with bitumen and some calcite fillings. Rare very thin brownish-gray silty lenses and stringers.

Illustration No. SBR-3846P (Sheet 44 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of rich oil shale with fine silty stringer from 759.8 feet: X-ray - dolomite, quartz, feldspar, calcite, analcite.
Lower wavy bed 760.2	761.7	Tuff and lean oil shale: medium to light gray tuff (4.5-7N); buff to rare brownish-black oil shale (10YR 7/2-2/2, rare 8/2 and 1/2). Very common very contorted and broken stringers of finely laminated oil shale in massive silty to fine sandy-textured tuff. Very irregular parting and fracture. Common black bitumen impregnations. Rare fine pyrite blebs and patches in tuff. Irregular interfingering contacts at top and bottom. Sample of gray tuff with common very fine bitumen specks from 760.8 feet: X-ray - quartz, analcite; some feldspar, pyrite.
761.7	763.0	Oil shale, rich to medium and tuff: medium to dark brownish-gray and some brownish-black oil shale (10YR 4/2-2/2, some 1/2), common satiny and rare resinous luster in upper part, dolomitic to very calcareous. Faint very irregular and distorted to fairly smooth laminations; some loop structures in upper part. Irregular thick parting; conchoidal fracture. Some fine tan silty stringers in upper part. Rare fine pyrite streaks in lower part. Buff to buff-white, silty to chalky tuff (10YR 7/2-9/2) from 762.0 to 762.5 feet with some interfingering thick to fine contorted oil-shale stringers. Sample of buff-white chalky tuff from 762.4 feet: X-ray - quartz, feldspar (sanidine and albite), analcite.
763.0	766.1	Tuff: buff to buff-white (10YR 7/2-9/2), slightly calcareous. Mottled and streaked to massive; silty to chalky. Very irregular fracture. Common very irregular intersecting fractures with some bitumen and rare very fine-grained pyrite fillings. Some yellow limonite stains in lower part. A thick contorted and broken brownish-gray to yellowish-buff (bleached?) oil-shale stringer near base. Uneven sample split. Sample of earthy to chalky fractured tuff with rare pyrite from 765.3 feet: X-ray - feldspar (sanidine and albite), quartz; some pyrite, analcite.

Illustration No. SBR-3846P (Sheet 45 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
766.1	768.1	<p>Oil shale, lean: medium brown and brownish-gray to tan and buff (10YR 4/3 and 4/2-6/3 and 7/2, some 6/4-7/3), very calcareous. Fairly distinct to faint, smooth to some contorted and broken laminations. Slightly irregular to very irregular thick parting; very irregular fracture. Very common irregular intersecting fractures with rare bitumen fillings. Some buff earthy to chalky bands in lower part.</p> <p>Sample of smoothly laminated fractured shale from 766.7 feet: X-ray - dolomite; some feldspar, quartz.</p> <p>Sample of fractured buff earthy band from 767.6 feet: X-ray - quartz; some dolomite, feldspar.</p>
768.1	771.1	<p>Oil shale, lean: dark brownish-gray to tan and rare buff (10YR 3/2-6/3, rare 2/2 and 7/2), very calcareous to some slightly calcareous. Faint to some very distinct, smooth to some irregular, distorted and displaced laminations; some loop structures. Very irregular to some slightly irregular parting; very irregular to conchoidal fracture. Some slightly irregular calcite-filled vertical fractures; some irregular intersecting fractures in upper part. Rare thin buff earthy to fine crystalline stringers.</p> <p>Sample of thin buff earthy to crystalline stringer from 769.5 feet: X-ray - analcite, feldspar (sanidine).</p> <p>Sample of distinctly laminated normal oil shale from 769.8 feet: X-ray - dolomite, quartz, feldspar, calcite.</p>
771.1	772.8	<p>Oil shale, medium to lean: medium to light brownish-gray and rare yellowish-buff (10YR 4/2-6/2, rare 2.5Y 6/3-7/3), calcareous. Very faint to moderately distinct, fairly smooth to irregular, distorted and displaced laminations; some loop structures. Very regular to slightly irregular, thick to medium shaly parting; conchoidal fracture. Common fine dark gray pyritic streaks and laminae. Rare short irregular fine tight fractures--some with massive pyrite and dark gray pyritic fillings.</p> <p>Sample of lean oil shale with dark gray laminae and streaks from 771.9 feet: X-ray - dolomite, pyrite, feldspar; some quartz, calcite.</p>

Illustration No. SBR-3846P (Sheet 46 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
Top of B-groove 772.8	775.8	<p>Marlstone and very lean oil shale: very light buff to tan and very rare dark brownish-gray (10YR 9/2-6/3, rare 5/3-3/2), very calcareous. Moderately distinct to faint, slightly irregular, distorted and displaced to smooth laminations; common small loop structures. Very regular to slightly irregular, medium to thick shaly parting; conchoidal fracture. Some fine vertical fractures with irregular dull brown to black coatings. Very rare thin massive pyrite streaks. A 1-inch chalky white tuff band at 773.5 feet; a 2-inch chalky white to gray tuff band with common massive pyrite specks and blebs at 775.0 feet.</p> <p>Sample of chalky white tuff band from 773.5 feet: X-ray - feldspar (sanidine and albite), analcite.</p> <p>Sample of marlstone from 774.1 feet: X-ray - dolomite, feldspar.</p> <p>Sample of white tuff with common pyrite from 775.0 feet: X-ray - feldspar (sanidine and albite), pyrite, some analcite.</p>
775.8	779.8	<p>Marlstone: very light buff to rare light brownish-gray (10YR 9/2-7/2, rare 6/2, rare 5/3-4/3; some almost neutral), very calcareous. Very faint smooth laminations and some <u>very</u> faint smooth bedding. Regular to very irregular, medium to thick parting; very irregular to conchoidal fracture. Common irregular tight to open fractures with rare resinous brown crusts. Some yellow limonite stains. Some fine massive pyrite streaks in lower part. Badly broken up and possibly mixed up; very uneven sample split.</p> <p>Sample of faintly laminated marlstone from 776.9 feet: X-ray - dolomite, feldspar (sanidine and albite).</p> <p>Sample of faintly bedded marlstone from 777.9 feet: X-ray - dolomite, quartz, feldspar, illite.</p> <p>Sample of very faintly laminated marlstone with fine pyrite streaks from 779.7 feet: X-ray - dolomite, quartz, feldspar, illite.</p>
779.8	782.7	<p>Marlstone and very lean oil shale: buff to rare medium and dark brownish-gray (10YR 8/1-6/2, rare 5/2-3/2), very calcareous. Faint contorted and broken to rare smooth laminations and stringers. Irregular parting and fracture. Very common irregular fractures and spongy to vuggy brecciated zones with common crystalline calcite and pyrite.</p>

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Getty Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Sample of finely brecciated marlstone from 780.1 feet: X-ray - dolomite; some feldspar, analcite.
		Sample of spongy to vuggy marlstone with common pyrite from 782.3 feet: X-ray - pyrite, dolomite, feldspar.
782.7	785.0	Marlstone and very lean oil shale: very light buff to light and rare medium brownish-gray (10YR 9/2-6/2, rare 5/2), calcareous. Moderately distinct to very faint very smooth laminations. Very regular and rare irregular thick shaly parting; conchoidal fracture. Some fine pyrite laminae and streaks. Some fine fairly smooth vertical fractures--one at 783.4-783.8 feet has pyrite filling and fine short parallel dull black sills. A very thin irregular finely brecciated zone with common pyrite and some <u>small</u> cavities at 783.8 feet. A very thin smooth white chalky to dull crystalline band with common pyrite blebs at 783.9 feet. Sample of very lean smoothly laminated oil shale from 783.1 feet: X-ray - dolomite, feldspar. Sample of thin white band with pyrite blebs from 783.9 feet: X-ray - feldspar, pyrite.
785.0	786.0	Oil shale, lean: medium brownish-gray and brown to tan and buff (10YR 5/2 and 5/3-7/2, some 4/2 and 8/2), very calcareous. Fairly distinct to some very faint, very smooth to slightly irregular, distorted and displaced laminations. Very regular to some irregular, medium to thick shaly parting; very conchoidal fracture. Some fairly smooth fine tight vertical fractures. Some thin to fine dark gray very pyritic crystalline laminae, stringers, streaks, and blebs; rare short thin irregular vertical injections or fracture fillings. Sample of shale with thin irregular dark gray pyritic vertical stringer and some buff crystalline material from 785.3 feet: X-ray - dolomite, pyrite, feldspar, some analcite.
786.0	787.3	Marlstone: light buff to tan (10YR 8/2-6/3), very calcareous. Very faint fairly smooth laminations to contorted and broken stringers. Slightly irregular to very irregular parting; conchoidal to very irregular fracture.

Illustration No. SBR-3846P (Sheet 48 of 49)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples of Garry Oil Company's Corehole No. 2 (Con.)

From	To	Description
		Common brecciated to earthy crushed zones with small irregular cavities and some white calcite. Rare very fine disseminated pyrite. Some parts very badly broken up; uneven sample split.
		Sample of earthy crushed marlstone or lean oil shale from 787.1 feet:
		X-ray - dolomite; some feldspar, quartz, analcite.
787.3	789.0	Oil shale, rich: brownish-black to rare medium brown (10YR 1/2-2/2, rare 3/2-5/3), some satiny to resinous luster, dolomitic. Faint to very faint, irregular and distorted to contorted and broken laminations, stringers, and streaks. Slightly irregular to very irregular and some "curly" parting; conchoidal to irregular fracture. Common medium to thin irregular dense gray to brownish-gray dolomite bands from 787.7 to 788.1 feet. Some very irregular fractures with vitreous black bitumen fillings in lower 0.4 feet. Some very fine pyrite streaks in upper part. Uneven sample split.
		Sample of normal rich oil shale from 787.4 feet:
		X-ray - dolomite, quartz, feldspar.
		Sample of dense brownish-gray dolomite band from 787.7 feet:
		X-ray - dolomite, quartz, feldspar, magnesite?
789.0	790.7	Oil shale, bitumen impregnated: brownish-black to dark brownish-gray and rare medium brown (10YR 1/2-3/2, rare 4/3), dolomitic. Very faint to faint, very contorted and broken laminations. Very irregular parting and fracture. Very common fractures and coarsely brecciated to finely crushed zones with very much vitreous to resinous black bitumen. Very uneven sample split.
		Sample of bitumen-impregnated crushed oil shale from 789.5 feet:
		X-ray - dolomite, quartz, feldspar, magnesite.
790.7	791.0	Oil shale, rich: dark brownish-gray to tan and rare brownish-black (10YR 2/2-5/3, rare 1/2), rare slight resinous luster, calcareous. Fairly distinct to faint, slightly contorted and broken to fairly regular and smoothly curved laminations (laminae in lower part inclined about 20°). Slightly irregular curved parting; slightly conchoidal and rare hackly fracture; slightly elastic and tough. Rare very thin irregular dense to silty brown stringers with some pyrite. Some very fine pyrite streaks and rare lenses.
		Sample of regularly laminated oil shale with very fine pyrite streaks from 790.8 feet:
		X-ray - dolomite, feldspar, calcite, quartz, analcite.
Bottom of core		

Illustration No. SBR-3846P (Sheet 49 of 49)